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WESTERN AUSTRALIA

REPORT

of the

Commissioner of Public Health

for the year

1953

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Report of the Commissioner of Public Health

To the Honourable the Minister for Health.

I have the honour to submit the Report of the Department of Public Health for the year 1953.

A reference to the Vital Statistics contained in Appendix XXV shows that the Death Rate was 8·15 per 1,000 ; the Birth Rate, 25·47 ; the Infant Mortality Rate, 23·83 per 1,000 live births, and that the natural increase of the population was 17·32 per 1,000 of the population. Any community presenting such rates must be regarded as inherently healthy and fairly well provided with health and medical services. Much of this is doubtless due to climatic, social and economic factors and there is therefore no need for complacency. The morbidity and death rates of our population may be low in comparison with those of other countries, but they are still not as low as they might be in a country with such natural advantages. It behoves us, therefore, to make the good even better.

One way in which this may be done is to endeavour to improve the standard of medical practice in the State. This statement must not be taken to be a criticism of the work of our medical men who are doing the best that can be done in the circumstances in which they are working. It has been estimated that the people of the State spend annually over £7,000,000 on its medical and associated services, including hospitals, preventive medicine, mental health, private medical and pharmaceutical services. In striking contrast, it spends almost nothing in attempting to improve the *quality* of the medical service it receives.

The establishing of the Clinical Research Unit under the Directorship of Dr. Eric Saint at the Royal Perth Hospital was a recognition of the need to raise our medical standards, but its work will be gravely handicapped by the absence of associated departments of pathology, biochemistry and physiology organised at a university level.

There can be no doubt that the establishment of a medical school at the University of Western Australia would do much to improve the quality of the medical service given to the people of the State. The cost of maintaining a medical school is insignificant in comparison with the total cost of the services just mentioned. It is unrealistic to hesitate at the cost of establishing a medical school on the grounds of " economy."

If one were asked how best to expend public money in the interests of the public health at the present stage of our development, one would unhesitatingly say that the comparatively small amount spent on a medical school would give the most fruitful and economic yield.

ADMINISTRATION.

No major changes in the pattern of the administration of the Department have occurred during the year.

STATE HEALTH COUNCIL.

Two meetings of the State Health Council were held during the year ended 31st December, 1953. The Maternal and Infant Health Committee met twice and the Hospital Requirements Committee once.

The resolutions and recommendations made by the State Health Council received careful consideration by the State Government, and were approved.

Among the more important matters dealt with by the Health Council were :—

1. *Hospital Policy.*

Throughout the year the Hospital Requirements Committee continued its deliberations concerning a hospital programme for the State. It has had the benefit of the advice of Professor Gordon Stephenson, the Town Planning Consultant to the State Government, Mr. Hepburn, the Town Planning Commissioner, Mr. Clare, the Principal Architect, and Mr. Prescott, the Vice-Chancellor of the University.

A complete and exhaustive analysis has been made of the existing hospital accommodation, its quality, the distribution of the hospital needs of all parts of the State at the present, and the potential needs of the future, allowing for the anticipated increase and distribution of the population.

The results of these investigations and decisions by the Hospital Requirements Committee and of the State Health Council itself have been finally prepared and recorded by Dr. Davidson—*see* his Report, Appendix I.—and it is strongly urged that these be studied with care.

Since the end of the war this State has had a large relative increase in its population and, although vast sums of money have been spent in providing houses for this population, and schools, communications and other public services, almost no new hospital construction other than the completion of part of the new Royal Perth Hospital, has taken place, apart from some minor additions.

In previous reports it has been emphasised that the greatest deficiencies existed in the metropolitan area. Reference to Dr. Davidson's report will show clearly the present deficiency, the calculated deficiencies in each succeeding year up to the end of the century, and the recommended building programme which will be required to supply these present and anticipated deficiencies.

It is realised that hospital construction is very costly and that every care should be taken to ensure that the expenditure of these large sums of public money is economically done, but the rapid expansion of the population makes the hospital bed shortage increasingly critical and warrants immediate and resolute action.

Any Department responsible for advising on hospital policy should be conscientious and free from the pressure of local importunity which must be, inevitably, prejudiced. An unbiassed and open-minded approach to hospital planning is essential in the public interest.

Attention is drawn to that section of Dr. Davidson's report dealing with the need to expand and co-ordinate the services providing for the care and rehabilitation of the chronic sick and the aged. The problems associated with this important branch of public health work have been approached in the past piecemeal ; what is needed now is an integration of all these activities under a unified control by the public Health Department.

2. *Rehabilitation of Cases of Arthritis, Hemiplegia, Paraplegia, and the Physically Handicapped.*

The Council recommended :—

1. that early consideration be given to the establishment of a domiciliary service for the treatment of cases of hemiplegia and arthritis and allied conditions ;
2. that action be taken to investigate the practicability of the establishment of an Institute for the treatment of these cases ;
3. that the Infectious Diseases Hospital, Subiaco, would be an ideal place for such an Institution.

In the course of the year action was taken to put into effect these recommendations and some staff has been engaged for the purpose.

3. *Health Education.*

The Council approved of the need to further and expand activities in regard to the health education of the people.

Action has taken place accordingly, and proposals for the formation of a Health Education Council will shortly be submitted.

4. *Appointment of a Medical Superintendent at the King Edward Memorial Hospital.*

Following the recommendation of the Council, the Government approved of such an appointment, and Dr. A. G. Mathew commenced duty on 19th October, 1953.

5. *Issue of Immunisation Certificates for the personal record of all prophylactic treatment administered to children.*

These certificates have been printed and distributed to local authorities and are now in use.

6. *Medical Treatment of Natives.*

Suggestions were made for a scheme to provide for the payment of the private medical treatment of natives. In the course of the year, however, certain difficulties arose, and the matter is receiving further consideration.

7. *The use of portable machines for fluoroscopic screening.*

The dangers associated with the use of portable X-ray machines for fluoroscopic examinations (screening), were considered. The advice of radiologists was obtained and, as a result, fluorescent screens were withdrawn from those country hospitals where the only X-ray apparatus available was of the portable and unprotected type.

LOCAL AUTHORITIES.

There is little to add to the comments made in the Annual Report of 1952 concerning the activities of the Local Health Authorities. The same reluctance to assume their responsibilities under the Health Act exists among many. It is agreed that many of these authorities are small in population, although not in size geographically, and that they are really uneconomic units for local government.

The appointment of a Royal Commission to enquire into local authority boundaries in the metropolitan area has been noted with approval. It is hoped that this Commission will be able to effect some amalgamation of some of the smaller local authorities with the formation of larger units of local government. If effected, this would produce a more efficient machinery for the administration of the Health Act.

In any case, almost all local authorities need to appreciate that their principal health responsibility is not to spend as little money as possible but to determine the most efficient means of spending that revenue which they may obtain from the Health Rate under the Health Act. This will require a change of heart in their approach to their responsibilities.

The organisation of the State into Health Regions each of which to appoint a Health Inspector, is proceeding slowly. The difficulty is that qualified Health Inspectors are rare and, further, there is a reluctance on the part of qualified men to serve all their time in large areas in the State where they are constantly on the move and where they have little home life. The whole policy is to be reconsidered.

FOOD AND INSPECTORIAL STAFF.

The following notes have been submitted by Mr. A. C. Stephens, the Chief Health Inspector.

The development of new and important industries and the carrying out of important health surveys called for assistance from the staff, consequently fewer regional inspections were done this year than last. Nevertheless, our distant areas, such as the Kimberleys and Upper Murchison districts, were not neglected as inspections were made as usual. Assistance was given to Local Authorities during the absence of their Inspectors, whilst on leave or through illness, especially where meat inspection was a major duty.

The Annual Conference of Health Inspectors employed by the Local Health Authorities was held in the St. John Ambulance Hall on 9th and 10th July, 1953. A large gathering of Inspectors and others interested in health work attended.

The Conference was opened by the Hon Minister for Health, Mr. E. Nulsen. The following lectures and addresses were given :—

Address by	The Commissioner of Public Health (Dr. Linley Henzell).
Address by	Dr. W. S. Davidson, Department of Public Health.
" Proposed Establishment of an Australian Institute of Public Health	Mr. H. P. Salter, Health Inspectors' Association.
" Control of Communicable Diseases by Local Authorities	Dr. D. J. R. Snow.
Symposium : " Bread "	Mr. G. Reid, Bakers Union. Mr. Edmonds, Master Bakers Association. Dr. Samuels, Government Chemical Laboratories.
" Chemical Additives in Food "	Mr. Hood, Government Chemical Laboratories.
" Country Towns Sewerage "	Mr. F. L. Morrison, M.W.S.S. & D. Department.
Address by	Town Planning Commissioner, Mr. J. A. Hepburn.

FOOD SAMPLES SUBMITTED IN 1953.

Food.	Number.	Number failing to comply with Regulations.
Aerated Water	5	1
Bread	1	1
Butter	1	1
Butter—Lemon	1	1
Coconut—Desiccated	173	14
Fish	6	5
Fruit—Tinned	4	1
Jam	1	....
Lactose	2	....
Milk—Bacteriological	9	2
Milk—Chemical	7	2
Meat	1	....
Peas—Tinned	7	....
Rice	1	....
Water—Bacteriological	15	2
Water—Chemical	....	....

Samples of water were obtained during the year from swimming pools. Of 79 taken for bacteriological examination 53 gave unsatisfactory results.

Prosecutions.

None were initiated by the Department during the year.

Wharf Inspection.

Consignments of fish imported into the State totalled 1,779,176 lbs. Revenue received was £527 6s. 5d.

Condemnations.

172 bags of rice.

Five consignments of Cod Fillets were not released for sale owing to the use of coal tar dyes not permitted under our Food and Drug Regulations.

Septic Tanks.

7,350 permits were issued for tanks at £1 and 220 at £2. This year shows an increase on last year's permits of 1,205, and 56 respectively. Total revenue received, including sales of plans, was £7,838 5s.

Meat Inspection.

For this year there has been an increase over last year's figures of over 10,000 cattle, 6,000 calves, and 149,000 sheep. Pigs decreased by nearly 9,000. Two Local Authorities had meat inspection for only a few months during the year owing to the resignation of their Inspectors.

To our Departmental Inspectors my sincere thanks are given for their close co-operation. To Inspectors of the Local Authorities thanks are also extended for their readiness to investigate any health matters to which they had been directed.

HEALTH OF THE NATIVE POPULATION.

Towards the end of the year it was becoming apparent that an earlier proposal to arrange for the medical treatment of the natives in the South-Western part of the State was breaking down. This arrangement was that when a native consulted a private doctor, the latter endeavoured to collect a private fee from the native and, if this was unsuccessful, the matter was referred to the Department of Native Affairs which paid the doctor and then endeavoured to collect from the native.

Owing to the fact that natives often have no fixed place of abode and that they are in any case either unable or unwilling to pay the Department of Native Affairs, it was discovered that that Department was unable to collect and that, in any case, it was contrary to its policy and its function to be regarded by the natives as a debt collecting agency.

Fresh proposals are being prepared for submission to the Government in order to try to solve this difficult problem.

In the South-West there are approximately 6,000 natives and their medical care falls to the responsibility of a small number of medical men. It is obviously unjust that these few medical men should be expected to shoulder this burden without any financial reward whatever.

In the North-West and the Kimberleys, medical attention given to the natives is supplied by the Department's Medical Officers. Where a native has citizenship rights he is charged the usual doctor's fees. Other natives are not charged as the Department receives a subsidy from the Native Affairs Department to cover these cases.

In the course of the year considerable concern was felt at the prevalence of eye disease in the Kimberleys and the North-West. Accordingly, the Department's Ophthalmological Consultant, Professor Ida Mann, made a survey of the Kimberleys and the North-Western parts of the State in the months of July, August and September. Her report has been printed and circulated. It revealed what had been previously suspected, that trachoma—an infective eye condition, which, untreated, will lead to impairment of vision and blindness—is very prevalent in the north and that over 50 per cent. of the natives are affected. Ten per cent. of the natives have some resultant impairment of their vision leading to total blindness in 5·7 per cent. of all natives. Approximately one-third of all natives over the age of 60 are blind. In addition, an incalculable amount of disability and misery is caused by this previously intractable and relentless blight.

Fortunately, the disease can now be treated and cured, particularly in its early stages. The task, however, of organising this treatment over such a wide area with poor communications is a major one and strenuous efforts will be made next year to overcome it.

The health of natives generally is inseparable from their housing conditions. There has been little improvement in these in the course of the year. The danger and incongruity of natives living in squalid and filthy hovels on stations and in townships (especially in the Kimberleys and the North-West) in close association with the white population, are so obvious that it is astonishing that these conditions continue. Urgent action is needed to improve the housing and sanitary conditions under which natives live in this State.

Professor Mann's Report—Appendix II.

LEPROSY.

The results of leprosy treatment at the Derby Lebrosarium continue to be most satisfactory.

Reference to Appendix III, shows that the number of patients being treated in the Leprosarium declined from 303 on 31st December, 1952, to 262 on 31st December, 1953, and that the discharges for the year were 56, a figure more than twice as great as the number of new cases admitted—25. These figures are very encouraging.

There is no difficulty now in persuading natives to enter for treatment, because of the greatly improved prospects of their having their disease controlled.

Improved treatment has resulted in an increased number of discharges and a return of patients to their normal lives and occupations. The Department's Medical Officers are paying more attention therefore to the crippling effects produced by neural leprosy and attention is drawn to the report on " Surgical Aspects in the Management of Leprosy " by Dr. Eoin Aberdeen to this aspect of the disease (see Appendix IV). This matter will receive further attention.

PUBLIC HEALTH LABORATORIES.

The overcrowding of the Public Health Laboratories in the Royal Perth Hospital has become more acute than ever. In his Report (see Appendix V.), Dr. Young, the Director, shows that during 1953 there was an increase of 35·6 per cent. in examinations in all laboratories, and 27·9 per cent. in those at the Royal Perth Hospital. Of the 156,580 examinations carried out at the Royal Perth Hospital, those for the hospital's purposes showed an increase of 41·9 per cent. over the previous year. This desirable increase had been stimulated largely by the work of the Clinical Research Unit under the direction of Dr. Eric Saint. There was a decrease in Public Health examinations performed at the hospital amounting to 5·6 per cent. The advice was sought of Dr. Edgar Thomson, Director of the Fairfax Institute of Patholgy, Royal Prince Alfred Hospital, Sydney, to whom great indebtedness is due for the time and attention he gave to this problem. It was abvious that increased laboratory accommodation was needed and that, as has been mentioned in previous reports, the time has come to separate the Public Health Laboratories and the Royal Perth Hospital Laboratories and to house the former in separate accommodation outside the hospital.

Dr. Thomson, agreed with this proposal but, failing the practicability of the construction of a new hospital institute of Pathology adjacent to the hospital, or of a new Public Health Laboratory in the immediate future, agreed that the extension of the laboratory floor space by extension into ward accommodation under construction on the hospital's fourth floor would serve as a temporary expedient and would suffice for perhaps another three or four years. He also agreed with the proposal to found an Institute of Hygiene and preventive Medicine at the University, the initial stage of which could be the construction of new Public Health Laboratories.

More medical graduates and trained technicians are needed in the laboratories. Unfortunately, both are in very short supply in Australia.

During the year the number of examinations at the King Edward Memorial Hospital Laboratory increased by 90 per cent. and that of the Dental Hospital by 51 per cent.

During the year the resources of the laboratory were taxed in the bacteriological examination of infected imported desiccated coconut. Routine public health examinations of water, food and milk, as well as serological work in connection with the zoonoses have had to be curtailed because of the shortage of floor space and trained staff.

In spite of these handicaps, the laboratory staff is to be congratulated on the organising and the carrying out of lecture-demonstrations to trainee nurses of the Royal Perth Hospital and other training schools. This has resulted in a greatly increased comprehension of the principles of Hygiene by the nurses.

The Biochemical Section was greatly strengthened in January when Dr. D. Curnow commenced duty as Biochemist. The Department and the hospital are fortunate to obtain his services, which already have produced a considerable widening of the scope and complexity of the work of the section.

The burden of both Microbiology and Haematology is too great for Dr. Kovacs to bear unaided, and the appointment of a Haematologist is strongly urged.

Rooms for elementary laboratory procedures have been established and equipped in the hospitals at Geraldton, Collie, Pinjarra and Busselton. At Bunbury, some structural alterations will be needed to existing buildings.

King Edward Memorial Laboratory.—Special attention is drawn to that section of Dr. Young's report dealing with this branch laboratory. The growth of this laboratory is seen by a comparison of the total number of examinations made since 1950. These are :—

1950	6,155
1951	17,245
1952	19,034
1953	36,022

The great increase in the past year has been due to the continuation and expansion of the outstanding work done by Dr. Kelsall, the Honary Rescusitation Officer, and Mr. Vos on Rh incompatibility (*see* the special section in Dr. Young's report), and also to the appointment of Dr. Mathew as Medical Superintendent. Dr. Mathew, in collaboration with Dr. Snow, the Department's Epidemiologist, carried out an investigation into staphylococcal skin infections in the infants born in the hospital, as a result of which the infections were controlled.

TUBERCULOSIS CONTROL BRANCH.

On reading the Report of Dr. Alan King (*see* Appendix VI) the Director of the Tuberculosis Control Branch, one has only to learn that the death rate for tuberculosis of all forms had been reduced during the year to 7·4 per 100,000 and that of pulmonary tuberculosis to 6·9 per 100,000, to realise the outstanding work being done by this Branch. Dr. King and his staff are to be congratulated on the magnitude of their achievement. With this congratulation one should couple the name of Sir Harry Wunderly, the Commonwealth Director of Tuberculosis, whose services to the community of Australia have been fittingly rewarded by the granting of a Knighthood. It is impossible to overestimate the value of the informed co-operation which he constantly gives to the State Health Department in its tuberculosis control work.

In his report, Dr. King describes the continuing of his established programme, with expansions during the year. Once more, it is very pleasing to note the co-operation received from the hospitals and private medical men, both in the country and in the metropolitan area, all of whom have combined with Dr. King to form an efficient working partnership. Dr. King's Report, together with those of Dr. Heymanson and Dr. Elphick, will repay careful study—*see* Appendices Nos. VII, VIII.

CANCER RESEARCH UNIT.

The work of this Unit was gravely handicapped by the sudden death of Professor Gye in October, 1952.

Projects which he had planned and which were in operation were carried on and completed, when practicable, by Professor Ida Mann, who, however, considered it inadvisable to continue the activities of the Unit after the end of December, 1953. In her Report (*see* Appendix X), reference is made to the work which she completed during the year.

On 1st January, 1954, the premises were handed back to Dr. Bennetts of the Department of Agriculture, to whom our thanks are due to his understanding co-operation in allowing this work to be undertaken on his premises.

It is regretted that the death of Dr. Gye has necessitated this closure, and a tribute should be paid to Dr. Ida Mann for the manner in which she carried on the researches of the Unit during the year.

STAFF PUBLICATIONS.

Dr. Snow has prepared abstracts of publications by members of the staff of the Department during the year—*see* Appendix XI.

COMMUNICABLE DISEASES.

In his Report (*see* Appendix XII), Dr. Snow, the Department's Epidemiologist, outlines the functions of an Epidemiological Section of a Public Health Department. The work of this Department in this respect is handicapped by inadequate laboratory services, to which reference is made in the section of this report dealing with laboratories.

For example, if it had been possible to perform the routine and necessary periodic bacteriological examination of imported desiccated coconut throughout the year, the presence of this contaminated foodstuff would have been detected at a much earlier date than was the case. As it was, it was not until cases of typhoid fever occurred in other States and until desiccated coconut from Papua was implicated, that action could be taken to prevent the distribution of a foodstuff which had been faecally contaminated.

Further, Dr. Snow refers in his report to the prevalence of gastro-intestinal infections. These are very common in this State and an investigation of their prevalence and mode of spread urgently needed. This cannot be accomplished satisfactorily without greater laboratory resources than are at present available.

The low mortality rate during the year from diphtheria (0·16 per 100,000 of the population) is very satisfactory. Dr. Snow's account of a small outbreak at Esperance and the steps taken by the Department to control it are interesting and significant.

A small outbreak of influenza is also described. " Influenza " is a term which is used very loosely by the public and should certainly not necessarily be taken to be synonymous with the epidemic virus disease.

We are indebted to the assistance given in laboratory investigations by the Walter & Eliza Hall Institute, Melbourne, and the Commonwealth Serum Laboratory.

In a further Report on the History of some Communicable Diseases in Western Australia (1828–1951), Part III (*see* Appendix XIII), Dr. Snow discusses the history of influenza, typhoid fever and murine typhus in this State. His comments are well prepared, and illustrate the long-term results which may be obtained by routine public health measures over the years.

ENTOMOLOGICAL SURVEY.

The need has long been felt of an entomological survey in this State, particularly in the tropical north, to determine the prevalence and seasonal variation of insect vectors of disease. Epidemics of malaria have been reported in the Kimberleys in the past, and the potential of the Kimberley region in this respect is of great importance not only to the public health in normal times but to the Defence Forces in time of war.

As a result of the co-operation of the University and Professor Waring, Professor of Biology, the services of Dr. Hodgkin, Reader in Entomology, were obtained. Accompanied by Mr. Britten, an Inspector of this Department, he spent some weeks in the North-West. A copy of his report is contained in Appendix XXIII.

This important entomological work is to continue.

Reference should also be made to the co-operation of Professor Ford of the School of Public Health and Tropical Medicine, University of Sydney, where difficult insect specimens are referred for expert opinion.

VENEREAL DISEASE.

Attention is drawn to the Report (*see* Appendix XIV) of Dr. D. S. Mackenzie, the Medical Officer in charge of the Venereal Disease Clinic at the Royal Perth Hospital.

Under the Health Act, a person who is suffering from a venereal disease may be called on to state the source from which it was contracted. As a result of this information, it is possible to form an opinion concerning the main avenues of infection.

Few men indicate that the disease was contracted from a professional prostitute. The great majority name a casual pick-up—the " amateur."

There is reason to believe that the brothels which house the professionals are under good medical control. Although prostitutes are not licensed in this State, the proprietors of the houses ensure that there is a regular medical inspection of the women, reasonable precautions are taken, and any suspicious disease is treated, the woman in the meanwhile being put off work.

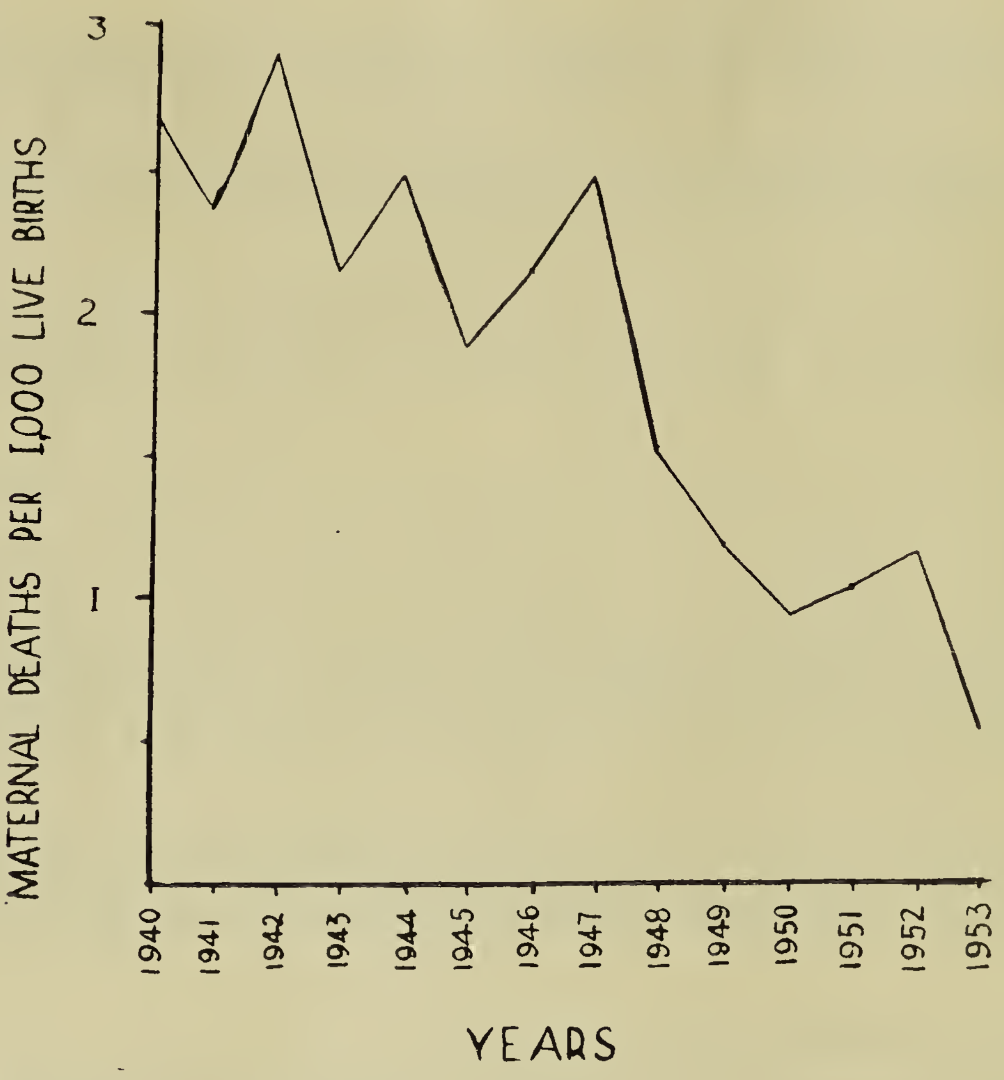
For both syphilis and gonorrhoea there is a swift and efficacious cure, with the use of modern drugs and antibiotics.

The earnest co-operation of the public is requested and any person who is suspicious that he or she might be suffering from a venereal disease should seek immediate medical advice.

It is difficult to estimate the prevalence of these diseases in the community. Although they are notifiable under the Health Act (the name of the patient is not mentioned), there can be little doubt that many persons seek and obtain treatment without having their condition notified to the Public Health Department. However, the later complications of these diseases are becoming increasingly rare and more zeal in obtaining treatment on the part of the public would see them placed under complete control instead of the partial control which exists at the present.

MATERNAL HEALTH.

During the year the maternal death rate (deaths of mothers per 1,000 live births) was only 0·57—the lowest figure ever recorded. In 1952 the figure was 1·17. The following graph shows the decline in the rate since 1900 :—



MATERNAL MORTALITY · W.A. · 1940 1953

During the past year, greater attention has been paid by this Department and the British Medical Association to an improvement in the standard of obstetrical practice in the State. The Honorary Staff of the King Edward Memorial Hospital and the Post Graduate Committee of the British Medical Association have been active in this respect and lectures to general practitioners organised.

The State Government makes an annual grant of £750 to the Post Graduate Committee of the British Medical Assocation and this sum is expended in organised post-graduate lectures and demonstations, amongst other matters, in obstetrics. This activity has contributed to the reduction in the maternal death rate and is a concrete instance of the value of the Government's policy in subsidising post-graduate medical lectures.

However, one must not forget that there were only nine maternal deaths during the year and therefore that one further death would make a difference of approximately ten per cent. in the death rate. One should therefore have some caution in forcasting future death rates.

INFANT HEALTH.

In her Report, Appendix XVI, Dr. E. M. Stang, Medical Supervisor of Infant Health, reports that progress is continually being made in the organization and expansion of this valuable service.

The infant mortality rate for the year was 23·8 per 1,000 live births—a figure which is slightly above the Australian rate of 23·3. However, taking into account the sparse distribution of the population and the climate, this rate is satisfactory although it could be still further reduced.

Additional attention is required to the causes of deaths in infants in the early weeks of life, and this is related often to abnormal conditions in the mother. Both of these aspects are receiving the attention of the Department.

SCHOOL MEDICAL SERVICE.

In spite of the handicap of a reduced medical staff, the School Medical Service continues to give good results. It is difficult to estimate its value accurately, as immediate and dramatic improvements in the health of the school children cannot be expected, and many different factors such as a general improvement in the State's medical services and of the standard of living of the people as a whole play an important role. However, there can be no doubt that the service has contributed over the years to the improvement in child health (see Appendix XVII).

In her Report, Dr. Stang mentions the decline in cases of malnutrition and offers the comment that it is difficult to see why any child in the State should be undernourished. Undoubtedly, ignorance of a section of the public is a contributory cause—an ignorance shown in the lack of knowledge of what contributes a good diet. A progressive programme of health education will help to remedy this defect.

SCHOOL DENTAL SERVICE.

In his Report (Appendix XIX), the Senior Dental Officer, Mr. McKenna, outlines the volume of work done by his dental officers. The staff has been gravely handicapped by the shortage of dental officers. Of the establishment of 14 dental officers, there were six vacancies at the end of the year compared with two at the end of 1952. In the difficult circumstances, the volume of work done was very satisfactory. All efforts to recruit additional staff have been unsuccessful. In spite of these acknowledged shortages, local communities continue to press for preferential treatment from the staff at the expense of other localities. It is impossible to provide a full service with only half a staff and it is regretted that those clamouring for this preferential treatment are not more considerate of the needs of other sections of the community.

NURSING BRANCH.

Miss. P. F. Lee was appointed Principal Marton to the Department in March, 1952. During the past year she has introduced many improvements and developments in the nursing section of the activities of the Department.

Her Report (see Appendix XX), will indicate the directions in which this has been done. Special reference should be made to the institution of training for Nursing Aides, from which it is hoped that the difficulties of the staffing of our hospitals will be appreciably eased.

Miss Lee is to be congratulated on the energy and comprehension with which she performs her duties.

NURSES' REGISTRATION BOARD.

See Appendix XXI.

CONCLUSION.

I wish, Sir, to express my appreciation of your constant support of and sympathetic approach to the many problems associated with the work of the Department, and to members of the staff for their zeal and loyalty throughout the year.

LINLEY HENZELL, M.D. (London), B.Sc., D.P.H.
Commissioner of Public Health.

APPENDIX I.

HOSPITAL BUILDING PROGRAMME.

By Dr. W. S. Davidson.

In 1950 the hospital bed position throughout the State was examined and a programme of priorities compiled.

Since then certain circumstances have arisen which indicate the need for revision and modification of this programme. These circumstances have in the main been brought about by the following.—

1. The development of the Kwinana industrial and residential area.
2. The growth and distribution of population as visualised by the Town Planning Commission in its recent examination of the situation.
3. The probable inauguration of a Medical School in the near future.
4. The probability of bridge across the Narrows at no very distant date.

The planned development of the above alters considerably our previous concept of metropolitan development in that it does not accentuate the present east and west axis of the metropolitan area but develops along a north and south axis bringing the density of population considerably more westward.

In such a distribution of population and industry there must arise a need for improved communications along this north and south axis and in any such system of communications the Narrows must play an important part.

From this set of circumstances there has arisen in our planning the need for the following additions or amendments to our original plans.

1. A hospital in the Kwinana area at an early date.
2. A University hospital or teaching hospital for the Medical School.
3. Siting of a hospital in the South Perth area and one for North Perth in the direction of Wanneroo.
4. A recession in the priority of the acute general hospital at Midland Junction.

These may be considered in more detail.

1. *Kwinana.*

Growth of population has been variously estimated as from 20,000 in five years to something approaching 150,000 in 40 years to 50 years.

The nearest hospital to this area is at Fremantle and the resources of Fremantle Hospital are already severely taxed. There is therefore a need for an immediate start being made to a hospital in Kwinana. This hospital will eventually require to be a full sized major hospital but its rate of growth must be proportionate to the growth of the population.

We can therefore visualise its development as a 100 bed pavilion hospital developing in sections and, later, a multistoried hospital developing in wings of 100 or 200 beds, adjacent to it. The ultimate size of this hospital in the foreseeable future will be some 500 general beds and 75 maternity beds.

2. *University Hospital.*

In the immediate future the role of teaching hospital will naturally be taken by the Royal Perth Hospital, but it has several disadvantages which ill fit it for this role for any great length of time.

They are—

(a) Congestion in and around the site on which it is built, limiting expansion and parking.

(b) Not constructed for the purposes of a teaching hospital of modern standards.

(c) Remoteness from University.

(d) With adjacent industrial areas and railway termini the traffic in this area is congested and communications will worsen.

As there is a need for more first-class hospital beds, it is advisable to construct these in the first place in a University hospital, thereby meeting our commitments for hospital construction and, at the same time, providing a suitable hospital in which to teach and improve our knowledge of medicine.

A suitable site for this hospital may be obtained adjacent to the Chest Hospital soon to be commenced. It would, in conjunction with that hospital, form a hospital centre in close proximity to the University, well related to the centre of population density and on or near good lines of communication in all directions.

As this hospital will not primarily serve a defined area but will also supply the teaching and research facilities for the State, its ultimate size is dictated not so much by population in the area but by the maximum size of a workable hospital.

This is something in the nature of 800 beds and as there will eventually be the need from our growing population for such a number, it can be accepted that the University Hospital will ultimately be somewhere of that dimension. The stages of growth will be determined by funds available and the needs of the Medical School. Our deficit of first-class beds is such that it will not outgrow the demand for beds. As a first-class hospital its construction will from the first be multistoried and to provide teaching material the first instalment must be a substantial one at least in the region of 300 beds. The extent of which maternity and gynaecology are to be accommodated in this hospital will largely depend on the attitude of the Medical School.

3. *The South Perth and North Perth Hospitals.*

The large growth of population planned for these areas will require hospital facilities. Consequently, a site in South Perth in the vicinity of the south-eastern corner of the Collier plantation is being considered for a hospital, and a site in North Perth in the Wanneroo Road area will be selected when more is known about density of population and lines of communication.

As these hospitals will eventually be major hospitals of 500/600 beds their construction will be multistoried and developed in wings. It may be necessary, if population growth is slow, to commence with a pavilion section. These hospitals will contain maternity as well as general units.

4. *Population increases in Midland Junction.*

These are likely to be slower than in the areas previously dealt with ; there will, however, be increases, particularly in the hill areas to the east. This depends much on improvement of services such as water, electricity and transport.

For such development the general hospital at Midland Junction will be required but for the present its priority cannot be considered of a very high order. It would seem that our original plan of 200 beds will be sufficient as far as future planning can be foreseen. Owing to slow growth this will probably develop as a pavilion type hospital.

It is now necessary to reconsider and reconstruct our metropolitan hospital plan as a whole.

Hospital Plan for Metropolitan Area.

From the point of view of what is practicable in planning, the ultimate population of the metropolitan area can be taken as 1,000,000—this figure to be reached in approximately 40 years.

Our plan then is to distribute our hospitals in conformation with the anticipated distribution of this 1,000,000 people, the use the hospitals will be put to, and the lines of communication planned for this future metropolitan area. Having formed an idea of our ultimate distribution of hospital facilities it is then necessary to produce a chronological programme of construction to keep pace with the growth and distribution of population.

The plan is to be considered in three sections : Acute General Beds, Chronic Beds, Maternity Beds. A fourth section—Mental Beds—will be referred to but will not be fully dealt with as, to a large extent, it is a separate problem. It must, however, be kept in mind because the large development required in that direction must influence our spending powers in other directions.

General Acute Beds.

In 1950 we estimated the requirements of the metropolitan area as 5·56 per 1,000 population.

By the time the population is 1,000,000 this proportion should fall slightly because of the higher ratio of metropolitan population to country population and because of the better service provided by large regional hospitals in certain country towns. That is, the number of patients transferred from country to metropolitan area will have diminished in proportion to metropolitan patients. We can therefore say that our figure will be five per 1,000 population.

For 1,000,000 people this represents 5,000 beds. There are, according to our 1950 report, at present 1,900 beds. We are therefore required to provide 3,100 beds. The recommended distribution is as follows :—

Royal Perth Hospital	100	
University Hospital	800	
Kwinana Hospital	500	
New Fremantle Hospital	500	
South Perth Hospital	500	
North Perth Hospital	500	
Midland Junction Hospital	200	
		3,100

From the 1,900 beds at present in existence there must be deducted the 200 beds of the Fremantle Hospital which will become a chronic hospital on the building of the new Fremantle Hospital.

This deficit of 200 beds will be made good by an increasing use of the 200 beds in the Chest Hospital for diseases other than tuberculosis as that disease progressively diminishes under control measures.

In addition to the 200 Fremantle beds thus planned for reduction to chronic status, a considerable number more of the 1,900 will gradually revert to that level as progress in medicine requires new techniques, equipment and designs. Our planning then is, on the whole, below our estimated requirements. Against this we must bear in mind the possibility of private enterprise and construction by religious or other interested bodies. These, because of the costs of modern building and equipment, will be exceedingly limited.

We must also bear in mind the unknown factors, changes in medical technique, progress in preventive medicine, and political changes in responsibility for the care of the sick. These factors may increase or greatly decrease the need for beds. As previously stated, however, the hospitals must be designed for sectional construction in pace with the demand.

Chronic Beds.

Our estimation in 1950 was 2·9 per 1,000 population. There is nothing in population trends to indicate that this proportion may be reduced.

One million people will therefore require 2,900 chronic beds. In 1950 there existed 308.

Plan for provision of chronic beds :—

Old Fremantle Hospital	200	
At Infectious Diseases Hospital	500	approx.
" Sunset " and Mt. Henry	200	,,
Home of Peace	100	,,
	1,000	

There is therefore a large deficit of 1,600 beds in our plan. This deficit will be met by the lapse of many of our present acute beds to chronic status, by private enterprise and building by religious and other bodies, by the development of domiciliary care on a well organised system, by the use of any surplus beds in acute hospitals and, if necessary, by adding chronic wings to these hospitals.

The future of the Infectious Diseases Branch hospital may conveniently be discussed here.

Our examination of the hospital bed situation at the beginning of 1950 showed that in the metropolitan area there was a surplus of 126 acute general beds and a deficiency of 631 chronic beds.

The shortage of acute beds experienced at that time was due to the encroachment on acute beds by chronic patients.

Our policy then was to build acute bed hospitals of a high standard as it was realised that many of our present day acute beds fell short of standards required for that classification. With the building of acute beds, present sub-standard acute beds would then be allowed to revert to chronic beds.

There was one exception to this priciple and that was the Infectious Diseases Branch Hospital.

From the peculiarities of its construction, *i.e.*, the original building of half-ward units for future expansion, it was possible to increase the bed strength of this hospital more quickly and far more cheaply than the building of a new hospital.

It was therefore decided that to meet urgent requirements I.D.B. should be expanded to its full complement of beds.

The hospital's original planning does not, however, permit of it to be adopted as a first-class acute hospital. If expanded, it must therefore be considered as a chronic hospital in addition to any infectious disease accommodation provided.

Present beds approximate 90, fully expanded approximately 230. This does not include present annexes. Present annexes contain 40 beds. With some extension to these we can visualise a hospital of approximately 300 beds as a possible early development. Later development may include multistoried wings, adding considerably to the bed capacity as the need arises and funds are available.

In the survey of chronics in the metropolitan area in 1950 reports were received on 652 cases. In age groups they were :—

0–14	=	56	9%
15–59	=	163	25%
60–90+	=	433	66%
		652	

The main diseases recorded were :—

Cardiac	82
Hemiplegia	73
Malignancy	38
Arthritis	44
Frac. Femur	34
Senility	53
	324

If therefore we leave the cases designated by the somewhat unsatisfactory term of " senility " out of our calculations we find that nearly half of all our chronics fall into the categories of :—

Cardiac
Hemiplegia
Arthritis
Frac. Femur
Malignancy

Cardiac cases and hemiplegics have much in common because of the underlying arterio-sclerosis and hypertension common in both groups. Hemiplegics, arthritics and frac. femur cases have much in common with regard to treatment, *i.e.*, physiotherapy and rehabilitation.

It would therefore seem that a very useful purpose would be served in providing specialised hospital accommodation for these groups in that they cover a large part of our chronics ; facilities for diagnosis and treatment are not complex and there is a large degree of similarity in the treatment.

I would therefore suggest that I.D.B. hospital should be transformed to a chronic hospital with sufficient diagnostic equipment to cater for chronic cardiac, hemiplegic, arthritic and frac. femur cases and with dietetic, physiotherapeutic and rehabilitation services for their specialised treatment.

Accommodation may also be provided for chronic malignant cases where treatment largely would be a matter of sedation, nursing and minor operative procedures to relieve distress.

As physiotherapy is a major part of the treatment to be provided, the choice of I.D.B. is a good one in that physiotherapy facilities have to be provided and are already provided for poliomyelitis—a normal responsibility of an infectious disease hospital.

We previously estimated that in the metropolitan area we required 2·9 beds per 1,000 population for chronics. From the above figures of diseases it seems that 1·3 of the 2·9 fall into the five categories under consideration. That is, in a population of approximately 400,000, we would require 500 beds for chronic cardiac, hemiplegic, arthritic, frac. femur and malignant cases. Provision for half that number at I.D.B. would therefore not be excessive and the hospital would form a very good research centre for the management of this important section of geriatrics.

A certain number would necessarily remain in other chronic hospital beds but it is also desirable to extend our domiciliary services to cater for a great deal of home treatment in this branch of medicine. Domiciliary service of this kind requires a base hospital for periodic check-ups and in-patient treatment. Close co-operation between an I.D.B. hospital as above visualised and a domiciliary service including dietitian and physiotherapist services would therefore alleviate a great deal of suffering chronic sick and supply a geriatric service which we are sadly lacking. As at present anything up to 30 per cent. of the beds in our public hospitals are occupied by chronic sick, the scheme would also considerably ease the shortage of available acute beds.

In brief, the following recommendations are made :

1. Extension and modification of I.D.B. hospital and annexes :—

Infectious Beds	approx. 50
Chronic Beds	approx. 250

Chronic Beds to specialise in the following types of chronic care :—

Cardiac
Hemiplegic
Arthritic
Frac. Femur
Malignant

2. Linkage of I.D.B. with a domiciliary service which will include :—

    Nursing
    Physiotherapy
    Dietetics
    Home Help.

As this hospital would be a specialised unit and a major hospital dealing largely with transfer cases from all metropolitan and possibly country hospitals, it is desirable to give it complete autonomy, thereby allowing it to develop its speciality and provide its assistance to other hospitals indiscriminately.

Maternity Beds.

For a population of 1,000,000, a Birth Rate of 22 per 1,000 and an average stay in hospital of 12 days, the number of beds required is 800. This allows for a 10 per cent. wastage of beds in turnover of cases.

There are in existence or planned for immediate construction some 340 beds.

The following are suggested for future construction :—

Kwinana	75
South Perth	75
North Perth	75
Fremantle	50–75
Midland Junction	25–50
	300–350

This leaves a deficit of 110-160 beds which can be met by private enterprise, etc., University hospital or increase at King Edward Memorial Hospital, a reduced stay in hospital coupled with a domiciliary after-care service.

Again, the construction of beds is on a sectional basis and will be developed where and when required.

King Edward Memorial Hospital.

The above plan does not visualise an appreciable increase in maternity beds in the K.E.M.H. for the following reasons :—

1. Maternity units should be distributed with reference to density of population and within easy reach of the general practitioner managing the case.
2. K.E.M.H. as a teaching hospital should concentrate on difficult and public ward cases and allow normal private cases to be dealt with in other hospitals.
3. There is much in the construction of K.E.M.H. that may be considered obsolescent or inadequate for the modern management of maternity cases, and the Medical School may consider it advisable to build a maternity wing at the University Hospital rather than a major expansion of K.E.M.H.
4. There are at present sufficient beds in K.E.M.H. for the teaching purposes of the Medical School in its early stage.

This hospital is at present incomplete and must have certain facilities added to it to provide an adequate service during the interim period while other maternity units are built and to provide a standard suitable as a teaching hospital that is part of a Medical School.

New kitchens and dining rooms are required and suitable medical and administrative offices.

It is desirable that gynaecology should be taught in conjunction with obstetrics, therefore a gynaecology ward should be added.

There are inadequate facilities for ante-natal treatment and so an ante-natal ward is also required.

These facilities could presumably be included in a wing at right angles to the present building and the originally proposed extensions in line with the present building and the extra stories could be dispensed with or relegated to a time and need not foreseen in our plan.

The proposed additions to K.E.M.H. are a matter of considerable urgency as at present the absence of sufficient ante-natal beds seriously curtails the efficiency of maternity services in the State.

Mental Beds.

Our figures in 1950 showed that Mental Bed requirements were 3·63 per 1,000 of population. In comparison with figures in the United Kingdom and the U.S.A. this is not an over-estimate.

One million in the metropolitan area would mean a population in the State of at least 1,400,000. For that population we would require 5,082 mental beds. There are at present some 1,200 ; therefore 3,882 have to be provided in our ultimate plan. A huge deficit already exists and construction of mental beds is one of the highest priorities.

Apart from special hospitals for acute and chronic mental illnesses, special facilities for out-patient and in-patient treatment of mental illness should be provided in all major hospitals. This, however, will provide for only a fraction of the problem. More than 3,500 beds will have to be provided in mental institutions by the time the metropolitan population reaches 1,000,000.

Programme.

It is necessary now to produce a programme by developing the plan in a form of chronological order best suited to our needs and with an even distribution of whatever financial resources may be at our disposal.

The programme suggested can best be followed from the diagram.

The vertical shaded columns indicate the years during which the respective works should be undertaken. The figures represent the annual cost of this work in thousands of pounds. The total annual cost is shown in column 33 and indicates an average annual expenditure for new construction work in hospitals in the State of over a million pounds for as far ahead as we can foresee. This cost does not make allowance for any fluctuation in building costs from present day levels.

The high totals for the years 1955, 1956 and 1957 are an indication of the deficit that has been allowed to accumulate in the past years and is an indication of the critical stage we have reached in hospital accommodation.

Small country hospitals are not shown in detail. There are 60 of these and if we take the life of such hospitals as 60 years we can assume the necessity of replacing one hospital per year. In replacing a country hospital it is usually possible to make considerable use of the buildings replaced and so economise in new construction.

The building of a small country hospital is therefore estimated at the low figure of £50,000.

The diagram shows the anticipated increase in population, the beds required for that increase, and how our plan meets these requirements.

CHRONIC AND AGED SICK.

In all civilised countries there is a rapid growth of the proportion of the population that consists of individuals over the age of 60. This has brought into prominence the diseases of old age, not so much because of the numbers afflicted but because of the chronicity of their incapacitation and the need for prolonged hospital or institutional care. The demand for such care constitutes a grave problem in all highly developed countries because of the tremendous cost of building and maintaining accommodation for such cases.

The cost of building modern hospitals for acute diseases is in the region of £8,000 per bed. The general experience in this and other countries is that, in addition to any special accommodation that may have been obtained for them, the aged chronics monopolise some 20 per cent. to 30 per cent. of general hospital beds.

It is generally accepted that this is uneconomical and unnecessary for the following reasons :—

Much of their illness can be prevented.

Much can be done to rehabilitate them despite their incapacities.

Accommodation and facilities cheaper and simpler than that in general hospitals can adequately meet the requirements of their condition.

Prevention.

Senile degeneration of tissues inevitably leads to limitation of activity and capacity to lead a self-supporting existence but this incapacity is facilitated and accelerated by inadequate mental adjustment to the situation. It is the feeling of hopelessness, loneliness and lack of interest that introverts the aged mind on itself to dwell on the infirmities of the body and exaggerates its inability to meet the situation and overcome its difficulties. Once set on this downward path, decline to chronic invalidism is rapid, and rehabilitation is rejected or difficult to apply.

If therefore we are to meet and overcome the problem with economy and humanity, it is necessary for us to adjust our social outlook to overcome the apathy of society and the aged towards the numbered years of the aged and their potential for useful and satisfactory living.

This cannot be obtained by patchwork provision of placebos or pensions. These may lighten the conscience of society but not the burden of the aged. They require above all friendly and intelligent assistance to develop interests external to themselves and fields of useful and satisfactory recreation or employment to maintain the activity of their minds and prevent that introversion and degeneration which leads to chronic mental and physical incapacity. They require also a form of medical and hospital care which has for its objective, in addition to control of disease, the maximum possible rehabilitation of the patient and not his segregation in homes for the hopeless or incarceration in the institutes of the insane.

Our task, then, begins not at the lingering deathbed of the aged but at the moment of retirement from active employment. We must see that he does not have an opportunity to develop the loneliness, despondency and introversion from which his invalidism springs. We must obtain for him the interests, the recreations and the useful employments which fortify his desire for active life and maintain his self respect.

Other countries have recognised the foolishness of penalising a man for offering his contribution in the daily toil of society. What a man has earned in the way of pension by years of contribution of effort cannot justifiably be withheld if he seeks to continue this effort, if need be at a reduced level, beyond the allotted span for qualification for that pension. It is also unreasonable to expect that in retirement a man will exercise himself in productive effort of useful employment if the sum total of his monetary award is little different from that he would obtain by remaining idle on a pension.

It is therefore clear that in retirement a man should not be penalised by loss of pension if he earns by virtue of useful employment, thereby maintaining his interest in life, his self respect, and an empty bed in a chronic hospital. By no form of mathematics that explores ultimate benefits can this process be shown as an extravagance in the economics of the State.

Idleness is more deadly than toil. The old must be stimulated to maintain their interest in work.

Having contributed their years of effort the old are entitled to recreation. This, next to work, may best sustain interest in active life. It is difficult for the old and lonely to find this recreation. Given the facilities, however, in the form of clubs and lawns and the careful and unobtrusive guidance of skilled social workers, the over 60's can get together and once having broken through the barrier of their own reserve and inhibitions they can develop and extend recreational facilities and build up their own corner of society with vitality and interest.

This much, then, can be done to prevent invalidism in the aged ; much more will be done as we gain experience.

Rehabilitation.

When illness occurs, the main danger, apart from the severity of the disease, is the tendency to chronic invalidism brought about by the inflexibility of aging mind and tissues and their reluctance for reactivity after a period of enforced idleness in bed. The convalescence of the aged sick is therefore the time wherein usefulness and chronic invalidism are held in balance. The future depends on the efficiency of rehabilitation processes applied to them at this critical period.

It is obvious therefore that between the structure we have prepared for the treatment of his acute disease and the establishment for incurable infirmities, we require an edifice to the means of rehabilitation. That is, between the acute general hospital and the infirmary beds in homes for the aged, we require a place for the suitable provision of skilled rehabilitative processes and techniques.

These may be provided in the home of the patient, in special wings of general hospitals or in special hospitals set aside for the purpose, the main consideration being that these processes and techniques are pursued with intelligent vigour by persons skilled and interested in the speciality they comprise.

Accommodation and Facilities for Prevention, Treatment and Rehabilitation.

To the elderly, hospitals and institutes represent a restriction of liberty and a disruption of habit in the fixations of their circumscribed lives. They will therefore resist their admission to such places. Once they are in, however, and the situation accepted they become more and more dependant on the protection they afford. There is a growing fear of once again facing life in the open and they resist their discharge by subconsciously accentuating their infirmities in order to retain their bed in the security of hospital or institute.

Admission to hospital or institute should therefore be resorted to only if no other form of treatment is applicable. Once they are in, every effort should be made to speed their recovery and complete their rehabilitation for life outside.

We must therefore first of all apply ourselves to the care of the aged in their own homes. By a system of Health Visitors, Social Workers and Home Helpers, we can give them a feeling of security in that they are cared for. We can ensure that contacts are made for them with social clubs, recreation and useful employment. We can see that their homes remain homes in comfort and cleanliness and above all we can ensure that they are adequately fed. Many of these people are the sole survivors of a marriage terminated by the death of their partner.

How many of us, if alone, would bother to cook ourselves substantial meals ? How then can we expect the old, enfeebled and apathetic to do it ? Lack of meals induces malnutrition. Malnutrition increases the apathy and the vicious circle continues. The Home Help will see that proper meals are provided and the home cared for. We can improve the efficiency of the Home Help and increase the numbers cared for by provision of meals on wheels from a central kitchen.

We therefore exert ourselves to keep the aged in their own homes and to keep them fit and active. When illness occurs it, as far as possible, should be treated in the home. Medical Benefits and the Pensioner Medical Service cover the medical care. We must increase this cover with Domiciliary Nursing, Home Help and a domiciliary service of physiotherapists, dieticians, diversional therapists, etc. By so doing we prevent a large number of unnecessary admissions to hospital, and we will do so at a much less cost than the provision and maintenance a hospital requires. We will also prevent the onset of the hospital or institute complex and hasten the rehabilitation of the patient.

If acute illness requires admission to hospital we can expediate the return of the patient to active life by early therapeutic measures of rehabilitation in the hospital, in a special wing of the hospital, or in a specially equipped hospital and discharge the patient early to continue such treatment under the Domiciliary Service.

There remains, however, the problem of the aged without a home.

They exist in three categories :- Those in large State institutions ; those in charitable institutions of various types and sizes ; and those that use their lifetime savings to subsist in private sub-standard boarding-houses.

There can be little doubt that the large institution unless carefully planned and managed, is a soul-destroying organisation. The aged are better cared for in smaller groups in converted private residences or specially constructed buildings under the care of a sympathetic and understanding management which will assist them to organise their lives in small spheres of interest and activity without interference with personal liberty. There seems no reason why such homes should cater for only one sex. On the contrary, many advantages accrue from catering for both sexes in the same home and these advantages are reflected in the sustained interest and better health of the inmates.

In these days when large homes are no longer sought after the Government would do well to acquire them for homes for the aged. This is most particularly applicable if the home is at present used as a private hospital or nursing home. By acquiring them the Government ensures that valuable beds are not lost in these days of acute hospital bed shortage and it ensures possession of that accommodation for the aged when the day comes that the home or hospital is no longer suitable for treatment of the sick.

To Summarise :

We must tackle the problem of the aged before they go sick by maintaining their interest in life.

This is done by Social Workers obtaining contacts for the aged with social activities, recreation and useful employment.

Our pensions system should not penalise the pensioner for productive employment after retirement.

As far as possible the aged sick should be treated in their own homes with the assistance of a full domiciliary service.

When admitted to hospital they should be given special rehabilitation treatment to ensure their early discharge and suitability to live the fullest possible life in their own homes.

The aged without homes are best looked after in homes of moderate size, sympathetically managed and catering for both sexes.

The Government should acquire such homes as opportunity arises, particularly those homes at present used as private hospitals, which are being disposed of by their owners.

This programme, though extensive and possibly costly, is in all probability much cheaper than to allow the growth of chronic invalidism to develop unchecked with its excessive demands on hospital accommodation and its destruction of the productive effort of old age.

INDEX TO DIAGRAM.

1. Red Cross Blood Transfusion :
   - 1954–56—First half new centre and laboratories.
   - 1963–64—Complete new centre and laboratories.
2. Royal Perth Hospital :
   - 1954–57—Complete new wings and Nurses' Home, etc.
3. Colin Street Nurses' Training Centre :
   - 1954—Convert building to training centre.
4. " Devonleigh " :
   - 1954–55—Convert present Nurses' Training Centre to maternity wards, etc.
5. Infectious Diseases Hospital, Subiaco :
   - 1955–56—Extend two-storey wings. Nurses' Home.
   - 1965–67—Extend single-storey wings and add extra storey. Add to Nurses' Home.
   - 1983–85—Add 200-bed wing and extend Nurses' Home.
6. King Edward Memorial Hospital :
   - 1955–57.—Add 20 ante-natal and 20 gynaecological beds, dining-rooms, kitchens, offices, etc.
7. University Hospital :
   - 1959–62—300 beds.
   - 1971–73—200 beds plus 50 maternity beds.
   - 1981–84—Additions.
8. Public Health Laboratories :
   - 1958–59—Laboratories for Public Health use and University teaching.
   - 1963–64—Additions for University Hospital requirements.
   - 1977–80—Additions.
   - 1989–90—Additions.
9. North Perth Hospital :
   - 1961–62—25 maternity beds.
   - 1969–70—50 general beds.
   - 1985–86—175 general, 25 maternity beds.
   - 1993–94—200 beds.
10. South Perth Hospital :
    - 1963–64—25 maternity beds.
    - 1969–70—50 general beds.
    - 1987–88—175 general, 25 maternity beds.
    - 1993–94—200 beds.
11. Fremantle Old Hospital :
    - 1954–55—Convert Nurses' Quarters and " Bundi Kudji " to give 17 additional hospital beds.
    - 1968—Convert to chronic hospital.
12. Fremantle New Hospital :
    - 1965–68—300 general, 25 maternity.
    - 1975–77—175 general, 25 maternity.
    - 1991–92—Additions.
13. Kwinana-Rockingham Hospital :
    - 1954–55—25 general, 15 maternity.
    - 1964–66—190 general, 10 maternity.
    - 1978–79—Additions.
14. Midland Junction Hospital :
    - 1973–74—50 general, 25 maternity.
    - 1989—Additions.

INDEX TO DIAGRAM—continued.

15. " Sunset " and Mount Henry :
    1954–57—200 chronic or infirmary beds.
    1974–75—Additions.

16. Home of Peace (44 new beds at present nearly ready) :
    1960—Add 44 chronic beds.

17. Kalgoorlie :

18. Albany :
    1959—Commence Regional Hospital.

19. Geraldton :
    1967—Commence Regional Hospital.

20. Bunbury :
    1962—Commence Regional Hospital.

21. Northam :
    1971–72—New Hospital.

22–30. Important additions to other major country hospitals as shown in diagram.

31. Mental (Chronic) :
    1955–58—1,000 beds.
    1974–77—1,000 beds.

32. Mental (Acute) :
    1963–64—200 beds.
    1969–70—300 beds.
    1982–83—200 beds.
    1989–90—300 beds.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33										
—	Red Cross Blood.	R.P.H.	Collins Street, N.T.C.	Devonleigh.	I.D.B.	K.E.M.H.	University Hospital.	Public Health Labs.	North Perth Hospital.	South Perth Hospital.	Fremantle Hospital—Old.	Fremantle Hospital—New.	Kwinana.	Midland Junction Hospital.	Sunset and Mt. Henry.	Home of Peace.	Kalgoorlie	Albany.	Geraldton.	Bunbury.	Northam.	Merredin.	Narrogin.	Small Country Hospitals.	Collie.	Bridgetown.	Manjimup.	Busselton.	Katanning.	Pinjarra.	Mental.	Mental.	Annual Cost. £	Population in Thousands.		METROPOLITAN.							
																																		State.	Metro.	Beds Required.				Beds Available.			
																																				General at 5 per 1,000.	Chronic at 2·9	Maternal at ·8	Mental at* 3·63	General.	Chronic.	Maternal.	Mental.
1954	33	500	10	10	....	....	....	....	....	....	16	....	125	....	100	....	....	....	....	....	....	....	10	50	....	....	....	....	....	....	....	....	854,000	648·5	400	2,000	1,160	320	2,352	1,900	384	300	1,200
1955	33	300	....	10	400	57	....	....	....	....	16	....	125	....	50	....	....	....	....	....	....	....	10	50	50	....	30	....	....	....	750	....	1,881,000	663·9	409·2	2,046	1,187	327	2,406	2,042	528	320	1,200
1956	34	300	....	....	400	58	....	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	....	50	50	20	30	....	....	....	750	....	1,742,000	679·7	418·6	2,093	1,214	335	2,446	2,067	688	355	1,200
1957	....	400	....	....	....	60	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	50	....	30	....	....	....	....	750	....	1,290,000	695·8	428·2	2,141	1,242	343	2,502	2,067	788	355	1,700
1958	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	50	....	....	....	....	....	....	750	....	855,000	712·3	438·0	2,190	1,270	350	2,544	2,067	788	355	1,700
1959	....	....	....	....	....	....	750	50	....	....	....	....	....	....	....	....	....	200	....	....	....	....	....	50	....	....	....	....	....	....	....	....	1,050,000	729·1	448·2	2,241	1,300	359	2,603	2,067	788	355	2,200
1960	....	....	....	....	....	....	750	....	....	....	....	....	....	....	....	50	....	200	....	....	....	....	....	50	....	....	....	....	....	....	....	....	1,050,000	746·4	458·4	2,292	1,329	367	2,645	2,067	832	355	2,200
1961	....	....	....	....	....	....	750	....	50	....	....	....	....	....	....	....	....	200	....	....	....	....	....	50	....	....	....	....	50	....	....	....	1,100,000	764·1	469·0	2,345	1,360	375	2,707	2,067	832	355	2,200
1962	....	....	....	....	....	....	750	....	50	....	....	....	....	....	....	....	....	....	....	300	....	....	....	50	....	....	....	....	....	....	....	....	1,150,000	782·2	479·8	2,399	1,391	384	2,752	2,367	832	380	2,200
1963	100	....	....	....	....	....	....	50	....	50	....	....	....	....	....	....	....	....	....	300	....	....	....	50	....	....	....	....	....	....	....	400	950,000	800·7	490·8	2,454	1,423	393	2,815	2,367	832	380	2,200
1964	50	....	....	....	....	....	....	50	....	50	....	....	500	....	....	....	....	....	....	....	....	....	50	50	....	....	....	....	....	....	....	400	1,150,000	819·7	502·1	2,510	1,456	402	2,861	2,367	832	405	2,400
1965	....	....	....	....	100	....	....	....	....	....	....	600	500	....	....	....	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	....	1,250,000	839·2	513·6	2,568	1,489	411	2,927	2,367	832	405	2,400
1966	....	....	....	....	200	....	....	....	....	....	....	600	500	....	....	....	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	....	1,350,000	859·0	525·4	2,627	1,524	420	2,975	2,567	832	415	2,400
1967	....	....	....	....	200	....	....	....	....	....	5	600	....	....	....	....	....	....	400	....	....	....	....	50	....	....	....	....	....	....	....	....	1,255,000	879·4	537·5	2,687	1,559	430	3,044	2,567	932	415	2,400
1968	....	....	....	....	....	....	....	....	....	....	5	700	....	....	....	....	....	....	400	....	....	....	....	50	....	....	....	....	....	....	....	....	1,155,000	900·2	549·8	2,749	1,594	440	3,093	2,667	1,132	440	2,400
1969	....	....	....	....	....	....	....	....	150	150	....	....	....	....	....	....	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	600	950,000	921·6	562·4	2,812	1,631	450	3,164	2,667	1,132	440	2,400
1970	....	....	....	....	....	....	....	....	150	150	....	....	....	....	....	....	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	600	950,000	943·4	575·3	2,876	1,668	460	3,216	2,767	1,132	440	2,750
1971	....	....	....	....	....	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....	300	....	....	50	....	....	....	....	....	....	....	....	850,000	965·8	588·5	2,942	1,707	471	3,290	2,767	1,132	440	2,750
1972	....	....	....	....	....	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....	300	....	....	50	50	....	....	....	....	....	....	....	900,000	988·7	602·1	3,010	1,746	482	3,344	2,767	1,132	440	2,750
1973	....	....	....	....	....	....	500	....	....	....	....	....	....	250	....	....	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	....	800,000	1,012·1	615·9	3,079	1,786	493	3,420	2,967	1,132	490	2,750
1974	....	....	....	....	....	....	....	....	....	....	....	....	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,036·1	630·1	3,150	1,827	504	3,476	....	....	....	....
1975	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,060·6	644·6	3,223	1,869	516	3,557	....	....	....	....
1976	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,085·8	659·4	3,279	1,912	527	3,614	....	....	....	....
1977	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,111·5	674·5	3,372	1,956	540	3,697	....	....	....	....
1978	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,137·9	690·0	3,450	2,001	552	3,757	....	....	....	....
1979	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,164·8	705·9	3,529	2,047	565	3,843	....	....	....	....
1980	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,192·4	722·1	3,610	2,094	578	3,905	....	....	....	....
1981	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,220·7	738·7	3,693	2,142	591	3,995	....	....	....	....
1982	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,249·6	755·7	3,778	2,191	605	4,060	....	....	....	....
1983	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,279·2	773·1	3,865	2,242	618	4,153	....	....	....	....
1984	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,309·5	790·8	3,954	2,293	632	4,220	....	....	....	....
1985	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,340·6	809·0	4,045	2,346	647	4,317	....	....	....	....
1986	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,372·4	827·6	4,138	2,400	662	4,386	....	....	....	....
1987	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,404·9	846·7	4,233	2,455	677	4,487	....	....	....	....
1988	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,438·2	866·1	4,330	2,512	693	4,558	....	....	....	....
1989	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,472·3	886·0	4,430	2,569	709	4,663	....	....	....	....
1990	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,507·2	906·4	4,532	2,629	725	4,738	....	....	....	....
1991	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,542·9	927·3	4,636	2,689	742	4,847	....	....	....	....
1992	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,579·5	948·6	4,743	2,751	759	4,924	....	....	....	....
1993	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1,616·9	970·4	4,852	2,814	776	5,037	4,800	1,384	690	4,350
1994	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....																

* Mental Beds Estimated on State Population.

Metropolitan Population Figures include Swan Division.

APPENDIX II.

OPHTHALMIC SURVEY

of the

KIMBERLEY DIVISION of WESTERN AUSTRALIA

by

PROFESSOR IDA MANN.

(Printed under separate cover.)

Appendix III.

DERBY LEPROSARIUM.

Admissions and Discharges for the Year 1953, compiled from Monthly Returns of the Superintendent.

Month.	Admissions.							Discharges.											Inmates Remaining in Leprosarium.		
	Males.			Females.			Total Ad-mitted.	Males.					Females.					Total Dis-charged.	Male.	Female.	Total Remain-ing.
	Ad-mitted.	Re-ad-mitted.	Total Males.	Ad-mitted.	Re-ad-mitted.	Total Females.		Dis-charged Cured.	De-ceased.	Ab-sconded.	Dis-charged Non-in-fectious.	Total Males Dis-charged.	Dis-charged Cured.	De-ceased.	Ab-sconded.	Dis-charged Non-in-fectious.	Total Females Dis-charged.				
January	2	1	3	1	....	1	4	....	....	....	....	....	....	....	....	....	....	....	191	116	307
February	....	....	....	....	....	....	....	16	....	....	....	16	8	....	....	....	8	24	175	108	283
March	....	1	1	....	....	....	1	2	....	....	....	2	1	1	....	....	2	4	174	106	280
April	....	....	....	....	....	....	....	1	1	....	....	2	....	....	....	....	....	2	172	106	278
May	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	1	171	106	277
June	....	....	....	....	....	....	....	8	....	....	....	8	7	....	....	....	7	15	163	99	262
July	2	....	2	1	1	2	4	....	1	....	....	1	....	....	....	....	....	1	164	101	265
August	1	....	1	1	....	1	2	....	1	....	....	1	....	....	....	....	....	1	164	102	266
September	7	....	7	2	....	2	9	....	3	....	....	3	....	....	....	....	....	3	168	104	272
October	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	168	104	272
November	4	....	4	1	....	1	5	5	....	....	....	5	4	....	....	....	4	9	167	101	268
December	....	....	....	....	....	....	....	....	....	....	....	....	4	2	....	....	6	6	167	95	262
Total	16	2	18	6	1	7	25	32	7	....	....	39	24	3	....	....	27	66	....	....	....

Analysis of Admissions and Discharges during Year 1953.

Inmates as at 31st December, 1952	303
Admissions for period ended 31st December, 1953	25
Discharged for period ended 31st December, 1953	56
Deaths for period ended 31st December, 1953	10
Absconded for period ended 31st December, 1953	....
Total remaining at Leprosarium as at 31st December, 1953	262

APPENDIX IV.

SURGICAL ASPECTS IN THE MANAGEMENT OF LEPROSY.

By Dr. Eoin Aberdeen.

From March to August, 1954, the writer was associated with the management of leprosy at the Derby Leprosarium. During the previous few years the writer had served as a Hospital Resident Surgical Officer in Melbourne, including periods attached to Plastic Surgery and Orthopaedic Units.

The association with the Leprosarium left a marked impression of opportunities to improve the limb deformities of the inmates. A survey of the " Leprosy Review " and the " International Journal of Leprosy" shows that very occasional reference has been made to the application of routine and well proven surgical methods to correct the deformities which follow leprosy. A notable exception is P.W. Brand of India.

(A) ANALYSIS OF THE CASES AT THE DERBY LEPROSARIUM.

Of 246 patients (163 male, 83 female—*i.e.*, 2 : 1 ratio) at the Leprosarium, 89 (62 male, 27 female) were found to have some deformity of the hands and/or feet. A detailed list of the deformities found in each case is attached. The deformities are grouped as follows :—

(a) Hand palsy without contracture (mild and severe) ;
(b) Hand palsy with contracture (mild and severe) ;
(c) Footdrop. (Where hand lesion is also present this is classified irrespective of Footdrop.)

(a) *Hand Palsy without Contractors ;*

Mild.	Severe.
33	6

Male.	Female.	Male.	Female.
23	10	4	2

Right.	Left.	Bilateral.	Right.	Left.	Bilateral.
17	10	6	4	1	1

Ulnar.	Ulnar and Median.	Ulnar.	Ulnar and Median.
30	3	3	3

(b) *Hand Palsy with Contracture ;*

Mild.	Severe.
20	18

Male.	Female.	Male.	Female.
14	6	15	3

Right.	Left.	Bilateral.	Right.	Left.	Bilateral.
8	9	3	5	7	6

Ulnar.	Ulnar and Median.	Ulnar.	Ulnar and Median.
13	7	10	8

(c) *Footdrop ;*

14 + 1 Perineal Palsy.

Male.	Female.
14	1

Left.	Right.	Bilateral.
4	8	3

Footdrop alone.	Footdrop + Hand.
6	9

TOTAL : Male 163, Female 83 = 246.

(B) INFERENCES.

Ulnar palsy invariably precedes a median nerve palsy in this series of cases. Where a median lesion exists the ulnar palsy is usually a severe one with a contracture. Whether there is a significant difference between right and left sides could probably only be decided in a larger series of cases. The ocurrences of peripheral nerve lesions are slightly higher in the males and this is particularly marked in the cases of foot-drop where fourteen males were affected and only one female. This raises the interesting possibility of whether a nerve lesion may be aggravated by exercise in the early stages of its development. Several of the patients had vivid memories of their period of nerve pain and had attributed this to some unusual form of exercise taken in the previous few days. For example, one young adult clearly remembered cleaning several station vehicles one or two days before the onset of severe arm pains.

The natural history of the development of the hand deformities would seem to be thus :—Firstly, the primary loss of the power of the small muscles of the hand on the ulnar side. This then results in a hyper-extension of the metacarpophalangeal (MP) joints. This alteration in the muscle balance of the hand then places the extensors at a mechanical disadvantage and full extension of the fingers is impossible with a hyper-extended MP joint, despite the retention of full power in the long flexors and extensors. In addition, flexion of the fingers is altered, the fingers now flex on themselves rather than into the palm forming a hook rather than a clenched fist. In all cases examined at the Leprosarium, the power of the long flexors and extensors was good. Brand describes the loss of power of flexor carpi ulnaris, but this was not tested in the cases under discussion.

The effect of prolonged flexion of the fingers over a period of years results in the development of scar tissue in the palmar skin which is probably accelerated by any trauma to this area. The constant distribution of the scar tissue in these cases does not suggest that it is primarily a result of trauma.

The invariable behaviour of developing scar tissue is contraction and these contractures further increase flexion deformities of the fingers. As a consequence of this prolonged flexion deformity, the next development is contraction of the capsular ligaments of the inter-phalangeal (IP) joints. This complication puts the joint beyond correction as it is known the contraction of the anterior capsular ligament does not respond to surgical intervention. It is probable that the most that can be done for an IP joint at this stage is arthrodesis in an optimum position, when the ultimate function for which the hand will be required has been considered.

By the time the hand has reached this late stage of ulnar, with or without median, palsy and scar tissue contracture, it is commonly associated with gross sensory loss and the resultant trophic changes.

No classification of the sensory loss in the hands or the feet of the patients at Derby has been made as it is considered to be too unreliable for use. The natives are trained from childhood to show no reaction to pain. Therefore when sensory tests are performed, it is often impossible to detect any objective reaction. The areas of sensory loss can apparently be charted effectively when relying on subjective response, but in many cases it was found that further examination gave quite different affected areas.

(C) SUGGESTIONS FOR SURGICAL MANAGEMENT.

During the course of an established case of leprosy there are two periods when operative interference may be of assistance. The first is during the stage of developing neuritis when relief of perineural pressure by both exposure of the nerve and opening of the nerve sheath do appear to relieve pain dramatically and probably reduce the incidence of later complications.

The second opportunity presents when the disease is " burnt out " or controlled by therapy when the resulting deformities of the hands and the feet would be effectively corrected by standardised surgical techniques. The late neural complications found in leprosy would seem to be fundamentally similar to the neural complications following trauma. That is to say the established principles of hand surgery and orthopaedic surgery can probably be applied in these cases. The only reference which the writer can find to well conducted work along these lines is that of Brand (3 and 4).

There are two definite contra-indications to attempting full restoration of hand movements :—

(1) Aged or otherwise unco-operative patient ;

(2) Contraction of the anterior capsular ligaments of the IP joints as demonstrated by limited extension.

The extension of the IP joint can still be estimated quite accurately in the presence of gross contracture by flexing the adjacent joint acutely and then attempting extension of the joint in question. Many cases at Derby with marked contractures of the fingers still have a good range of extension of the IP joints.

1. *Acute Nerve lesions ;*

A routine technique is now in use at the Leprosarium for these cases. The common sites of nerve stricture—namely the ulnar where it lies posterior to the elbow ; the median where it lies anterior to the wrist joint and the lateral popliteal where it crosses the fibula are exposed using a local anaesthetic, Lignocaine HCl 1% (Xylocaine) with Adrenalin. It has been found that a tourniquet is not necessary to produce a bloodless field when using this technique. From the small series of cases in which nerve exposure has been done at the Leprosarium it would appear that the relief of pain is dramatic and sustained, but the prevention of subsequent deformities can only be determined after a long period of observation. The results of this procedure have made the inmates ready volunteers for any surgical operation.

It has recently been suggested that one of the toxic reactions to one of the drugs used (I.N.H.) may be the occurrence of severe limb pains imitating a neural crisis and this point should be considered when selecting cases for operation.

2. *Feet ;*

The common lesion here is a footdrop with almost complete lack of power of the dorsi-flexors of the foot. Fourteen cases of footdrop were detected and in one case the peroneals only were paralysed. It was difficult to correlate clinical estimation of muscle power loss with the effect on the gait. Some cases who appeared to have complete loss of dorsi-flexion still had a normal gait. Others walked swinging the effected leg, with a high stepping gait and the footdrop apparent.

For those cases in whom the gait is affected, it would seem that the Lambrinudi type of operation would be most effective. It is understood that in England, Seddon has done or is about to do this procedure on some cases of leprosy brought from Africa for this purpose.

3. *Hands ;*

There are two operative procedures which would be likely to be most useful :—

(i) Replacement of scar tissue in the palmar surface of the fingers with thick split skin grafts or even whole thickness skin ;

(ii) Tendon transplantation. The object of the tendon transplant is to overcome hyperextension of the MP joints which follows the paralysis of the small muscles. Bunnell's procedure of transferring the insertion of the flexor sublimus tendons posteriorly to the extensor expansion is considered to be the operation of choice. These procedures should be done in this order—namely overcome the scar contracture and then correct the muscle balance of the hand. Brand has reported excellent results following tendon transplantation, but no reference to replacement of scar tissue with skin grafts could be found in the Leprosy Journals. Of the operative details, the following are significant :—

  (i) None of the suggested techniques could be expected to be of value unless employed by a surgeon trained in the principles of hand surgery and adept in their application. This is the dominant factor to be considered in hand repair work. The final selection of cases for operation must be left to the operator.

  (ii) Since dermatome grafts would need to be cut usually from the trunk, a general anaesthetic of an average of two or three hours' duration, sometimes considerably longer, would need to be given. This would call for an experienced anaesthetist. Even when an operation is confined to the hand, it would call for either a brachial plexus block or G.A. as a tourniquet must be used.

NON-OPERATIVE PROCEDURES.

The general care of the limbs of patients suffering from peripheral nerve loss presents a constant opportunity for the application of commonsence surgical principles. The subject has been well reviewed by Brand (4). If it is accepted that the destruction in the hands and feet of patients with leprosy is almost invariably due to the effects of trauma rather than to the natural history of the disease, then it will be seen that there is scope for considerable activity, not only in the nursing care of these patients, but in the education of the patients to avoid trauma or seek early treatment. Patients with nerve lesions have to learn to anticipate probable trauma and avoid it. They need to be taught how much of a liability the absence of sensation can be. Care of the feet would involve the absence of shoes or boots, walking on soft sand wherever possible and the avoidnance of any gravel or hard surfaces. They should be taught to avoid squatting for long periods and when shoes are used these should always be sewn and be devoid of nails. When the hands are involved the patient should not be allowed to perform occupations such as cooking where burns are almost inevitable. It may even be possible to persuade some of the smokers to use cigarette holders. A regular inspection of hands and feet would help to detect trophic lesions at an early stage and so make the management easier.

When a trophic lesion has developed it should be completely rested. In the case of the foot this involves either bed rest or the use of crutches until the lesion is completely healed.

When infection in an ulcer has been controlled, the application of a firm dressing is of advantage. The best dressing consists of a single layer of Tulle gras overlaid with dry surgical gauze and applied with a cotton crepe bandage. This dressing is absrobent and can be removed without tearing the newly formed epithelium. Any pressure dressing must be used with great care in these cases and never applied with more than a light pressure since painful reaction to a dangerously tight dressing is absent.

In addition an interesting point was observed by the Reverend Mother Alphonsus of Derby. If a firm dressing is applied before infection is completely controlled this almost invariably results in a sudden rise of temperature to 103°F. or higher and is relieved promptly by removing the dressing. It is suggested that the only method by which osteomyelitis can be determined accurately is by X-ray. The provision of a small X-ray unit at the Leprosarium would be a valuable addition in the management of these cases.

The method of choice in controlling development of the finger contractures is to overcome the initial hyperextension of the MP joint. This then permits the long extensors to act to a greater mechanical advantage and so extend the fingers. Flexion is also improved to allow a more normal grip. The use of a Bunnell's " Knuckle Duster " type splint permits this, and it is thought that the splint may be tolerated by the natives at the Leprosarium, especially when they become aware of the advantages it will offer them. It is felt that more complicated types of splint would not be tolerated by the natives, nor would any foot splints be of use, particularly as the majority do not wear shoes.

Passive exercises such as extending the fingers can only help to maintain the mobility of the joints. Occasional stretching has no place in the management of developing scar contractures. A scar contracture can only be controlled by constantly applied extension.

CONCLUSION.

The advent of drugs capable of controlling or curing leprosy has changed the approach to the management of the deformities caused by this disease. There exists at present a large field for the surgery of repair at the Derby Leprosarium. It is felt that the number of cases in which repair will be necessary in future, can be greatly reduced not only by the use of curative drugs but also by the application of methods of management standardised in other departments of surgery.

APPENDIX V.

ANNUAL REPORT FOR 1953.

PUBLIC HEALTH LABORATORIES.

WESTERN AUSTRALIA.

To the Commissioner of Public Health, Western Australia.

The following report is submitted on the work of the Public Health Laboratories situated in the Royal Perth Hospital, the King Edward Memorial Hospital and the Dental Hospital, both for these hospitals, other hospitals and general practitioners in Western Australia during the year 1953.

A still greater increase of work has been handled in the same or a worse state of congestion in all laboratories with the same disproportion of medically qualified and senior technical staff to junior technical and trainee staff.

A very disquieting feature at the end of the year is a group of five resignations from senior and junior technical staff, and other pending resignations.

The Expansion of all Laboratory Facilities and the Subdivision of Public Health Laboratories of the Royal Perth Hospital.

The Joint Advisory Committee on Laboratory Services representing the Public Health Department and the Hospital Board worked throughout the year on this problem.

The Hospital members of the Committee inspected the laboratories and were convinced of the acute congestion and unhygienic working conditions in the laboratories, which had been reported for four years.

The Director of Medical Laboratories recommended that the Royal Perth Hospital required a separate Institute of Pathology adjacent to the hospital to re-house its expanded laboratories, which should include teaching facilities, and the Public Health Department required a new Institute of Hygiene to house all the departmental laboratories for the expansion of public health laboratory work in all its branches.

On the Director's recommendation Dr. Edgar Thomson, Director of the Fairfax Institute of Pathology, Sydney, visited Perth and confirmed the above recommendations. But on the grounds of practicability, it was recommended by the Commissioner of Public Health that the Royal Perth Hospital laboratories should be expanded into the Fourth Floor of the new west wings of the hospital pending the building of a separate Institute of Pathology.

The detailed planning of the expanded laboratories on the Fourth Floor, Royal Perth Hospital, to include sections of bacteriology, serology and biochemistry were proceeded with and nearly completed at the end of the year. A new small series of haematology laboratories was planned and nearly completed on the 4th floor in rooms vacated by the Clinical Research Unit. Plans were also made for new media-making rooms, new wash-up rooms and new animal houses on the 9th floor. When the new animal houses are completed it is proposed to use the existing animal houses and animal post-mortem room as central laboratory stores.

Meanwhile, the Director worked on the initial planning of the requirements of such an Institute. He interested the Rockefeller Foundation of New York and the World Health Organisation in the project. The Rockefeller Foundation provided a grant for a study tour of hygiene institutes in America and planned a detailed itinerary. World Health Organisation arranged the details of a similar tour with the Ministry of Health in England and other bodies in various European countries. A large amount of preliminary work on this tour was completed at the end of the year.

General Staffing.—Dr. D. H. Curnow took up his duties as senior biochemist in January, 1953.

Dr. L. Szaloky commenced his probationary period of training for regional registration as a pathology registrar in October, 1953.

Five graduate technicians, one special technician and one biochemist's assistant, two laboratory assistants, six temporary laboratory assistants, one senior typist, one junior typist and one messenger were appointed during the year. One senior technician resigned and left, and letters of resignation were received from four other technicians.

The disadvantages of the present method of recruitment of new staff mentioned in the annual report for 1952 still continue. The delays in dealing with applicants for vacancies caused by resignations or recommended increases has not only worked against the maintenance of the general efficiency of the laboratory but has caused the loss of suitable applicants for technician's appointments. Recruitment of suitable male technicians from the Eastern States or from England has ceased owing to the difficulties of housing them. An organised staff housing scheme is urgently needed for married technicians.

The Staffing of Sectional Laboratories and Office.—The senior technician in the main histo-pathology laboratory in the Royal Perth Hospital resigned and left in September. The senior histo-pathology technician in the Dental Hospital was brought over to replace him, leaving the Dental Hospital Laboratory without any senior full-time technical assistance. As no replacement was obtained by the end of the year, the minimum of essential work had to be maintained there on a part-time basis.

The resignation of three senior technicians in the bacteriology section of the laboratories and further impending resignations will leave that section without any technical staff with any appreciable experience.

The Health of the Staff.—Respiratory infections caused the greatest degree of absenteeism throughout the year, but particularly in the winter months. Overcrowding and overheating of laboratories are at least important causes of the high infection rates. Mantoux testing was maintained for new staff and B.C.C. inocculation for Mantoux negatives.

Inoculation with tetanus toxoid was made available for all staff on a voluntary basis.

The Training of Cadets and Laboratory Assistants.—Three cadets were appointed to the five year course of training to qualify as technicians. The number of cadets in training is now seven, three in the first year, one in the second year and three in the third year. Their progress in technical work is maintained. A larger intake of cadets in 1954 will be required to fulfil the future laboratory requirements in Western Australia, and to build up a permanent staff of technicians to maintain the continuity whilst improving the standard of technical work here. Four laboratory assistants are also undergoing similar training for the Diploma of the Australian Association of Laboratory Technicians.

Laboratory Accommodation.—No increase was made during the year, but the new small haematology laboratories at the Royal Perth Hospital and some small alterations and additions to the King Edward Memorial Hospital laboratories were under way by the end of the year.

Animal House Accommodation.—Work is still restricted owing to shortage of space and irregular supply of animals. No further progress has been made with the development of an animal breeding station to supply the full needs of the laboratories. The provision of the new animal houses planned for the 9th floor will relieve congestion but will not in itself supply the animals required by active laboratories.

New Laboratory Equipment.—The major items of equipment added during the year were a flame-photometer attachment to the Hilger spectrophotometer, a Stanton micro-balance, a Watson Bactil microscope, an Eel flame photometer, one Prestcold refrigerator, a Speedivac pump, four hot air sterilising ovens, one Jones pH meter, one Kahn shaker, one Hartridge Reversion spectroscope, two M.S.E. Minor centrifuges, three incubators and one S.S. lined oven.

Various water baths and photographic equipment were also added to the equipment of various laboratories.

The Medical Laboratory Services of Western Australia.—Visits were made to the hospitals at Collie, Bunbury, Busselton, Albany, Narrogin and Geraldton to discuss improvements in laboratory services and to inspect sites for small clinical laboratories in each hospital. General interest was shown in the development of these laboratories. Fitted with basic equipment they can be utilised by the medical officers of the hospitals until such time as partly or fully trained technicians are available to take them over and develop them. Suitable accommodation capable of conversion into laboratories was found in the hospitals at Bunbury, Collie, Narrogin, Geraldton and Busselton. At Albany and at Northam small temporary laboratories would have to be built.

The only laboratory built and completed during the year was at Lake Grace Hospital.

Mr. A. Drummond, Technical Assistant of the Public Health Laboratories, visited Bunbury and prepared detailed plans for a laboratory set-up.

Except in relation to minor details no complaints were received of the laboratory service given to the country hospitals by the central laboratories.

The utilisation of express delivery services of all specimens was further stressed, and special " express " labels were sent to all centres for this purpose. Telephonic or telegraphic reporting was used for all country districts to cut down to a minimum reporting delays due to postal services. Diagnostic outfits were used in increasing numbers and larger variety. Eight different types of specimen containers are now provided and the total issue to Perth and country hospitals was 2,161 dozen.

Laboratory Planning for the Chest Clinic and new Chest Hospital.—In addition to the planning already mentioned for the Royal Perth Hospital, institute of hygiene laboratories and country laboratories, detailed plans were prepared for the laboratory divisions of the new Chest Clinic and the new Chest Hospital, and detailed equipment lists for the former, instead of working to a cost schedule, they were planned to optimum requirements and when completed they were then modified numerous times to effect various economies.

Contact with other Medical Laboratories.—No member of the staff made a visit to Eastern States Laboratories, but a tour was planned for Dr. Kovacs in the new year, in addition to the Director's projected tour.

Junior Medical Staff.—Two pathology residents were appointed for whole-time duty in the laboratory. One left during the year to take up other work and the other completed his year's training and is available for a senior pathology resident's or other appointment. The need for a larger number of whole-time pathology residents is great. It is only from these residents that junior clinical pathology staff is likely to be ultimately obtained.

General Routine Examinations.—The attached table shows an annual total of 197,774 examinations for all hospitals and branch laboratories. This is an increase of 35·6 per cent. over the figures for 1952. The 136,890 examinations carried out at the main laboratories at the Royal Perth Hospital showed an increase of 27·2 per cent. over 1952. The 104,819 examinations carried out for the Royal Perth Hospital constituted 76·5 per cent. of the total examinations. The 32,071 examinations carried out for the Public Health Department represented 23·5 per cent. of the total. The increase of total examinations for the Royal Perth Hospital is 41·9 per cent., whereas examinations done for the Public Health Department at the main laboratories decreased by 5·6 per cent. This decrease is largely due to the transference of some public health work from the main laboratories in the Royal Perth Hospital to the branch laboratory at the King Edward Memorial Hospital.

The figures for the King Edward Memorial Hospital laboratory show the greatest increase, 90 per cent., and the Dental Hospital laboratory despite its partial closure, shows an increase of 51 per cent.

Three hundred and eighty post mortem examinations were carried out compared with 353 in 1952. One thousand one hundred and sixty sections were cut in the laboratories of the Royal Perth Hospital. Five thousand five hundred and six sera were examined for the Wasserman Reaction, 8,359 for the Kahn test and 5,289 sera for various agglutination reactions. Three thousand eight hundred and nineteen Coombs Tests, direct and indirect, were performed. Fifty-nine thousand three hundred and forty-six examinations were carried out in the haematology laboratories, 31·75 per cent. of these being in the King Edward Memorial Hospital laboratory. Six thousand nine hundred and twelve examinations were performed in the tuberculosis laboratories and 334 examinations for Myco. leprae. Eight hundred and forty-two smears were examined for N. gonorrhoeae and 2,621 swabs for C. diphtheria. One thousand seven hundred and thirty-two water samples were examined, 22 milk samples and 34 air samples for bacterial content. One hundred and seventy-one medico-legal examinations were carried out for the police department. The accompanying table shows the monthly and annual figures of examinations in various sections of the laboratories.

EXAMINATIONS DONE.

Laboratories.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total, 1953.	Total, 1952.	Increase or Decrease per cent.
R.P.H. (Path. and Bact.)	6,786	7,064	7,834	8,602	8,833	7,815	8,428	9,098	8,881	12,245	11,602	7,631	104,819	73,805	41·928
Public Health (Path. & Bact.)	2,923	2,693	2,545	2,620	3,078	2,424	2,548	2,675	2,583	2,304	2,664	3,014	32,071	33,980	— 5·62
Total, R.P.H. and P.H.D.	9,709	9,757	10,379	11,222	11,911	10,239	10,976	11,773	11,464	14,549	14,266	10,645	136,980	107,785	27·29
Dental Hospital	264	757	522	466	844	509	524	515	....	....	420	94	4,915	3,253	51·09 (Lab. prac. closed since Sept.)
K.E.M.H.	1,699	2,288	2,741	2,892	2,868	3,149	3,496	3,310	3,251	3,067	3,298	4,210	36,269	19,080	90·07
Biochemistry	1,212	1,583	1,658	1,507	1,505	1,561	1,853	1,579	1,645	2,095	2,006	1,496	19,700	15,806	24·62
Grand Total	12,884	14,385	15,300	16,087	17,128	15,458	16,849	17,177	16,360	19,711	19,990	16,445	197,774	145,806	35·63

Histopathology.—Dr. T. R. Lubbe reports on a slight increase of post-mortem work partly carried out by the pathology residents and a considerable increase in post-mortem sections. The incidence of malignancy in biopsies showed 382 malignancies in 2,252 biopsies. No significant increase was shown in the malignancies of any particular organ. A 24-hour service from tissue to stained section was introduced cutting down the reporting time on sections which is still variable owing to shortage of qualified staff. The need for additional medical staff is now urgent if any progress is to be made in the development of this section of the laboratories. Changes of technical staff are mentioned elsewhere.

Planned re-arrangement of the working space in the laboratories, including a new bench and some shelving, should improve to a small extent the working conditions in these laboratories, and new equipment ordered should still further speed up the turnover of routine material.

A survey of post mortem findings compred with clinical diagnoses on 365 cadavers showed a complete correlation in 69·5 per cent. of cases, in 21 per cent. the post mortem findings differed entirely from the clinical findings, and in the remaining 9·5 per cent. there was a partial correlation. These figures, subject to the same reservations as were mentioned in the Annual Report for 1952, show almost identical figures to the 1952 figures.

Museum.—The museum received and stored 451 specimens during the year. Fifty-two new specimens were mounted and 50 old specimens were re-mounted and re-conditioned. Fifty-two perspex jars were made and 38 repaired.

The preparation of sections of museum specimens, the re-sorting of specimens, the making of perspex laboratory equipment and repairs to equipment filled the time of the one museum technician who was helped in the latter part of the year by a cadet trainee.

A large amount of illustrative material for wall panels is now available, partly mounted, partly unmounted, but owing to the uncertain future of the museum during most of the year no further panelling has been completed.

Little progress has been made with notes and descriptions of specimens and sections owing to the shortage of qualified staff.

Bacteriology.—Dr. N. Kovacs reports further improvement in the work of this section. S.S. Agar was introduced as a second selective medium for the identification of Salmonellae and Shigellae. It proved useful in the examination of 146 samples of desiccated coconut from which seven strains of S. nyborg and 30 of S. senftenberg were cultivated.

During the year the following new methods were introduced :—A semi-closed system with collapsible hood for the preparation of blood media ; a closed system for serum filtration ; new equipment for sterile filling of media sterilised by filtration ; a new medium for lactose fermentation, urease and indol production ; a modification of the Castaneda double medium for blood culture ; culture bottles with " Liquoid " for direct enrichment and for preparation of blood plates.

A liver broth medium was introduced for anaerobic cultures, as well as for the culture of Pneumococci and Streptococci. A new multipurpose medium for the differentiation of the Enterica was devised. At present this medium is under trial. With the introduction of this medium, we hope to eliminate at least four other types of media.

With the introduction of a simple modification of the blood-agar medium the number of positive pneumococcus results increased considerably.

Owing to shortage of staff our drinking water examination did not meet English standards. A new, cheap pipetting device was therefore introduced and this enabled us to perform water examination according to the above standards and to express our results in " probable number of coliform organisms."

The bacteriology of urine gave us a lot of problems, mainly due to the variety of the bacteria found in the specimens and also owing to the changing results in the different successive specimens. The solution of the problem rests with the collaboration of the clinicians and this should be one of the major problems to be solved during the coming year.

The biggest difficulty in the bacteriological department remains the shortage of staff, which made it impossible to cope with a lot of problems which cropped up during routine work, and the solution of which, we feel, would greatly simplify our task. Besides this, a bigger flexibility in the laboratory work would enable us to have a more intimate contact with honorary staff, especially as in the results of different examinations the laboratory can see a lot of unsolved clinical problems, the solution of which could be of great importance to the clinicians.

It should be mentioned that the bacteriologist and serology department handled 189 *medico-legal* examinations. The medico-legal examinations, with the necessary laboratory work, the reporting, and further with the time spent in the Police and Criminal Courts, are time consuming and are a heavy burden on the Bacteriologist. The medico-legal work can only be done at present at the expense of the bacteriology department and it would be most desirable if somebody else could be appointed to do this particular work.

Bacteriology-Tuberculosis.—Mr. A. M. C. Guthrie reports :—During the past year a total number of 4,314 specimens were received by the laboratory (2,508 from the Public Health Department and 1,806 from the Royal Perth Hospital) on which 6,912 examinations for Myco. tuberculosis were carried out. This figure showed a slight decrease of 3·3% on the previous year's figure of 7,150.

The examinations carried out for the Public Health Department increased 10·7% from 3,657 in 1952 to 3,907 (56·5% of the total) and those for the Royal Perth Hospital decreased 13·9% from 3,493 in 1952 to 3,005 (43·5% of the total).

The number of the individual patients concerned in the above figures were 1,605 (726 from the Royal Perth Hospital and 924 from the Public Health Department) and the number of patients found to have a tuberculosis infection was 299. Of these 221 were from the Public Health Department (23·9% of cases examined) and 78 from the Royal Perth Hospital (10·7% of cases examined).

One hundred and forty-nine cases, in which specimens of sputa were examined (14·7% of the total) and 91 cases in which gastric content specimens were examined (40% of the total) showed the presence of acid and alcohol fast bacilli, morphologically resembling Myco. tuberculosis.

Of these positive specimens examined by both culture and guinea pig inoculation 78 (73·6% of the total) were found to have positive culture and positive guinea pig, 13 (12·2% of the total) had negative culture and positive guinea pig, 11 (10·4% of the total) had positive culture and negative guinea pig and four specimens (3·8% of the total) had positive guinea pig but contaminated cultures.

The method used in these laboratories for the inoculation of gastric content specimen into guinea pigs is for the second of three consecutive specimens to be inoculated into the groin of the right leg and the third specimen into the groin of the left leg of the same animal. Out of 57 positive guinea pigs from gastric content specimens the results were as follows :—

Tuberculosis lesions in left leg gland only—27 = 47·4%
Tuberculosis lesions in glands of both legs—20 = 35%
Tuberculosis lesions in right leg gland only—10 = 17·6%.

From these figures it is obviously unsafe to depend on the result of one inoculation only.

Serology.—The function of this section which operated under the control of the chief technical assistant, Mr. A. Drummond, deals not only with bi-weekly batches of Wassermann Reactions and Gonococcal C.F. Tests, and daily agglutination tests for enteric and typhus fevers, brucellosis, infectious monocucleosis, and Q fever, but also includes pregnancy testing using rabbits, mice and toads, medico-legal serology, the manufacture and maintenance of glass apparatus, the preparation of lecture and demonstration material for nurses classes and administration dealing with junior staff, public health problems, stores maintenance, testing of equipment, etc.

A survey of meat workers at Wyndham and Midland Junction was carried out using " Rickettsia burneti " agglutinable suspensions and sera obtained by a member of the laboratory staff flown to Wyndham for the purpose. The results were negative, but a C.F. antigen was not obtainable for a complete test. These sera also failed to show agglutinins for Brucella.

The manufacture of some glass apparatus was very satisfactory and proved economical as compared with purchased glassware.

The cleaning staff under the charge of the technical assistant was increased and put on a full-time basis as work increased and became more specialised. The accommodation for the cleaners and those preparing diagnostic outfits for distribution was most unsatisfactory and overcrowded.

Lecture Demonstrations to Trainee Nurses.—A course prepared according to the Medical Research Council recommendations was organised for trainee nurses at the Royal Perth Hospital and other training centres. 49 lecture demonstrations prepared largely in the serology department were given by Pathology Residents and the technical assistant. The results of these practical training classes were strikingly shown in the hygiene examinations in which the nurses showed a considerable insight into problems of infection, sterilisation, etc.

Medico-Legal Examinations.—See Bacteriology and Serology.

Haematology.—Dr. N. Kovacs reports :—

In this year there were no major changes in the Department. The main stress was laid on maintaining the accuracy of examinations on a reasonably exact level.

The Lempert-Kristenson method of the counting of platelets, which was introduced at the end of 1952, proved very useful and the parallel examinations gave us reliable results.

The blood grouping technique and the recording of the results are now organised so that during the whole year only three errors were made, and these were detected in the laboratory before a transfusion was given.

To eliminate the effect of the variation of the outside temperature on the blood coagulation, we are using a wide-mouth Thermos bottle as a transportable water bath. The bottle is closed with a transparent plastic stopper in which three double holes were made. The plastic stopper serves as a rack for the coagulation tubes the ends of which are immersed into the fluid inside the bottle. When the Thermos bottle is not in use it is kept in an incubator at 37°C. ready for immediate use.

There was further increase in the number of cases of leukaemia. Dr. Szaloky carried out the differential counting of all these blood films and as a result a higher standard of reliability was maintained.

In collaboration with the Clinical Research Unit the appearance of warm and cold auto-agglutinins in haemolytic anaemias was investigated.

The results of prothrombin estimations were expressed, as before, in seconds, by examining 100 per cent. and 12·5 per cent. plasma. To facilitate the reading and to give the clinician a key to enable him to compare our results with those of other laboratories the results of the higher prothrombin times are also reported in prothrombin concentrations.

I feel, as I had already expressed in my report for 1952, that the haematological department needs a thorough reorganisation which can only be done by a full time haematologist.

Biochemistry.—Dr. D. H. Curnow reports :—

Staff.—During the year there has been an increase in the staff which has increased considerably the efficiency of the section, although it has created more overcrowding than ever in the limited space available in the present laboratory. Dr. Curnow, Miss Wreathall, Mr. Gillieatt and Miss Carter were new appointments. Mrs. Giles, who will be stationed at King Edward Memorial Hospital when the laboratory there is completed, has spent most of the year in this section, doing routine bio-chemistry and preparing for her research activities at King Edward Memorial Hospital. Miss Silberman took a year's leave without pay to go abroad to widen her experience and to receive training in protein biochemistry. She was supported by a grant from the Clinical Research Unit and arrangements were made for her to work at the Courtauld Institute, Middlesex Hospital, London. Miss Allsop, Miss Faulkner and Mr. Bokor were employed as vacation assistants.

Expansion.—A valuable extra store room was obtained from the hospital, and the 6th floor stem laboratory is being used as an electrolyte laboratory.

Teaching.—Lectures were given to student dietitians, who also spent some time in the laboratory observing techniques. Dr. Topliss and Mr. Manessis spent periods of training in the laboratory.

Routine Biochemistry Service.—In spite of a substantial increase in the number of requests there has been a considerable decrease in the time lapse between receipt of requests and issuing of reports due to improvements in staff, equipment (particularly the flame photometer, which is on loan from King Edward Memorial Hospital) and in organisation. There are still some deficiencies in the service, notably with blood sugars, keto-steroids and faecal fat estimations. It is hoped to overcome the delays in these estimations by the introduction of more efficient methods.

Reporting System.—A new series of report forms and record cards was designed, to satisfy the requirements of the new record system to be introduced in the Royal Perth Hospital in 1954.

Special Investigations.—*Porphyrins.*—(a) Studies in collaboration with the Clinical Research Unit were made on a number of cases of acute porphyria. (b) The coproporphyrin work in lead poisoning was hampered again by the delay in obtaining a fluorimeter.

Cardiac Catheterisation.—With the arrival of the completed manometric Van Slyke apparatus it was possible to accept the responsibility of blood gas analyses for the cardio-vascular unit. The necessary analyses have been carried out and valuable information obtained in three catheterisations.

Electrolytes.—In collaboration with the Clinical Research Unit a number of balance studies were carried out on surgical cases and information, of value particularly from a teaching point of view, was obtained. These studies were made possible by the use of the flame photometer and by an enthusiastic staff.

Copper Metabolism.—An extensive copper balance study was carried out on a patient with Wilson's disease, the analyses being carried out by Mr. Beck at the Animal Health and Nutrition Laboratories.

Oestrogens.—Preparations have been made for the assay of urinary oestrogens and it is anticipated that in 1954 a programme of steroid metabolism studies will be started.

Staff Meetings.—Informal lunch-hour staff meetings have been held regularly to maintain interchange of information between senior and junior staff and to develop interest in the biochemical literature in the junior staff. These meetings are improving in calibre and will form an important part in the activities of the laboratory.

General.—It will be seen that the year has been devoted largely to improving the routine biochemical service offered by this laboratory. Great improvements have been effected and it is hoped, in 1954, to carry this development further by instituting biochemical services, of a limited nature at first, in a number of country hospitals in the State. No attempt has been made to do this in 1953 because the policy has been adopted that, until the main laboratory is adequately staffed and equipped and can offer a first class service, both in routine work and in teaching, it is a waste of time to accept the responsibility of country laboratories. Major activities in 1954 will include the move to the 4th floor of the new Hospital building and the development of steroid, protein, enzyme and electrolyte studies.

Analysis of records shows a total of 20,445 routine tests carried out during the twelve months ended December, 1953, of which 19,273 were for patients of the Royal Perth Hospital and 1,172 for patients of other hospitals or for privately practising doctors. During 1952, routine tests totalled 15,230. Increases in 1953, have been marked in salt fractionations of serum proteins (455 in 1952, 1,542 in 1953), in serum electrolytes estimations (762 in 1952, 1,803 in 1953), serum amylase and urinary diastase estimations (68 in 1952, 323 in 1953) and in such tests of liver functions as serum alkaline phosphatase and bilirubin, thymol turbidity and flocculation. There has been a decrease in the number of blood urea and renal function test meals.

Photography.—A photography technician was appointed to form a laboratory photographic unit in July, 1953, and take over and develop the photographic work previously carried out by the museum staff. The equipment available was inadequate and new equipment although ordered was slow in arriving.

A very creditable start has been made by the photography technician using largely improvised and borrowed equipment in providing a temporary clinical photographic service as well as in chart copying, enlargements, specimen photography, the production of transparencies and lantern slides, photostat copying with some cinephotography, photomicrography, and colour photography.

King Edward Memorial Hospital Laboratory.—Mr. G. H. Vos reports :—

Serology.—Routine A.B.O. and Rh typing for King Edward Memorial Hospital Clinic cases has this year again shown a slight fall over figures of 1951 and 1952. The number of private cases examined, however, shows a marked increase of 150 per cent. and represents an actual increase of 3,284 cases.

This increase is largely due to centralisation of laboratory tests for routine pregnancy A.B.O. grouping, Rh typing and anti-Rh anti-body tests.

This action resulted in closer co-operation between private doctors and the King Edward Memorial Hospital laboratory when a case of Rh incompatability was found and further tests were indicated throughout the pregnancy.

Table I.

1.	2.	3.	4.
	Number of Rh Tests.	If unselected Expected Number of Rh. Cases.	Number of Rh Cases Actually Attended to.
1950	2,656	19	32
1951	3,944	29	61
1952	4,299	32	78
1953	7,191	53	87

Table I., column 2, shows the number of Rh cases actually attended to in this laboratory, and column 3 shows the number of Rh cases expected for the number of tests carried out. The figures in column 4 indicate that a large number of bloods tested are selected because of previous obstetrical history regarding Haemolytic disease of the Newborn. It is therefore not possible to estimate exactly the incidence of the disease, but it clearly shows the value of a blood group reference laboratory to assist private practitioners in this field of Medicine.

Routine Direct Coombs' tests are carried out on cord blood samples from Rh negative Mothers in which no anti-Rh agglutinins were detected during the ante-natal period.

Kahn testing of all clinic cases and private cases where requested has been continued.

On all Rh negative Mothers who show the presence of anti-Rh agglutinins, monthly Indirect Coombs' titrations are carried out until the 30th week of gestation, fortnightly until the 36th week and weekly if antibody behaviour indicates that it is necessary.

In all cases with anti-Rh agglutinins, the respective husbands are requested to attend for Rh genotyping in order that their Homo-, or Heterozygosity can be recorded to assist in diagnosis.

TABLE II.

———	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	1953.	1952.	1951.	1950.
A.B.O. Grouping and Rh typing CLINIC.	200	179	207	179	112	155	154	149	162	152	129	145	1,923	2,315	2,558	2,538
A.B.O. Grouping and Rh typing PRIVATE.	171	278	410	443	488	473	572	486	524	475	486	462	5,268	1,984	1,386	118
SEROLOGY	1,185	1,645	1,966	2,224	2,069	2,204	2,432	2,434	2,395	2,203	2,102	2,094	24,964	14,593	13,060	4,782
HAEMATOLOGY	303	230	400	277	239	451	470	388	415	434	336	353	4,296	3,382	3,160	1,194
BACTERIOLOGY	97	372	358	383	549	468	603	454	441	430	855	1,742	6,762	1,059	1,025	179
GRAND TOTAL	....	....	....	....	....	....	....	....	....	....	....	....	*36,022	*19,034	*17,245	*6,155

* Serology ; Haematology ; Bacteriology.

TABLE IIIA.

Nasal Swabs K.E.M.H. Nursing Staff, 1953.

Includes Sisters, Nurses and Nursing Aides.

Organisms isolated.	February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Staph. aureus, Haemolyticus, coagulase positive	13	50	49	62	35	43	16	45	20	22	32	27	14	38·8	6	10	22	24	11	14	12	48
Streptococcus haemolyticus	....	....	....	....	....	....	....	....	....	....	....	10·8	....	12·7	....	....	....	....	....	....	....	....
No Staph. aureus, or Strept. haemolyticus cultivated	13	50	29	38	46	57	19	55	72	78	84	72·2	21	58·5	53	90	70	76	63	86	13	52
TOTAL NUMBER = ...	26	....	78	....	81	....	35	....	92	....	116	....	35	....	59	....	92	....	74	....	25	....

TABLE IIIB.

Throat Swabs—K.E.M.H. Nursing Staff, 1953.

Includes Sisters, Nurses and Nursing Aides.

Organisms Isolated.	April.		May.		June.		July.		August.		September.		October.		November.		December.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Staphylococcus aureus, haemolyticus, coagulase positive	3	5	1	3·3	5	5·3	4	2·5	2	5·7	1	1·8	8	8·7	2	3·1	2	8·3
Streptococcus haemolyticus	14	22	9	25·7	10	10·5	11	9·2	6	16·6	9	15·2	4	4·3	7	10·4	2	8·3
No staphylococcus aureus or Streptococcus haemolyticus cultivated	46	73	25	71	80	84·2	104	87·3	28	77·7	49	83	80	86	58	86·5	20	83·4
Diplococcus pneumoniae	....	....	....	....	....	....	....	....	....	....	....	....	1	1·0	....	....	....	....
TOTAL NUMBER	63	....	35	....	95	....	119	....	36	....	59	....	93	....	67	....	24	....

Haematology. Routine haematological requests for the year show a slight increase. 4,296 such requests have been recorded against 3,382 for the previous year.

Preparation and Standardisation of Anti-Rh serum. This laboratory has, as in the previous year supplied Public Health Department Laboratories, 4th Floor, Royal Perth Hospital, Royal Perth Hospital Blood Bank, and Fremantle Blood Bank with standard anti-Rh serum.

In order that no suitable anti-Rh serum be wasted, all samples of serum from Mothers under special investigation is tested for its specificity and if suitable, arrangements are made with Dr. Kelsall, the honorary haematologist, and the Red Cross blood bank to bleed the patient.

Half of this supply is kept at King Edward Memorial Hospital laboratory and the remainder donated to the Red Cross blood bank for their use.

In order that specificity tests can be carried out, test cells from selected donors are kept for a period of six months or more in Glycerol Citrate at 20 degrees Centigrade and a record from each selected donor is kept with reference to their A.B.O., Rh, Kell, Fy^a, MNS, Lutheran and P factors.

If no special anti-serum is available in the Commonwealth, samples of blood from selected donors are forwarded for further blood group typing to Dr. R. Race, Blood Group Research Unit, the Lister Institute, London, S.W. 1.

This procedure is most essential in blood group study and the preparation of standard anti-Rh serum.

Maintenance of King Edward Memorial Hospital Blood Bank. This work continues to be carried out in the laboratories by a qualified Hospital Sister.

The laboratory provided reference facilities in connection with A.B.O. grouping, Rh typing and indirect Coombs' cross-matchings.

Bacteriology. The work in this section increased during the year by 600 per cent.

Routine nasal and throat swabbing of King Edward Memorial Hospital nursing staff commenced in February, 1953. (See table 3 for results of swabbings).

Figures in Table II (section Bacteriology) show that the hospital has become more conscious of bacteriological investigations since the appointment of a Superintendent.

Towards the latter months of 1953, routine aerobic and anaerobic examinations were carried out on all Clinic cases and where requested from private patients with puerperal fever.

Since the appointment of a bacteriology technician in the latter months of the year, limited routine investigations of air samples from various sections of the hospital and laundry and examinations of hand towels have been carried out to assist in investigations by the Superintendent, of Staphylococcus aureus infection throughout the hospital.

Biochemistry.—This section has continued to assist the Hospital in all routine requests for biochemical estimations.

Animal House.—A small animal house was built but not fitted out by the end of the year for the preparation of anti-M and N sera and anti-human globulin serum.

Dr. G. A. Kelsall reports :

Our investigations are concerned primarily with the foetal and neo-natal death rate in general, and particularly as it is affected by blood incompatibility. We have been studying the subject from different aspects from some 10 years and have based our lines of treatment upon the findings of the work of others and of ourselves.

The subject is, naturally, very complex and the numerous facets of the haemolytic disease of the Newborn have a very wide field for investigation. Among others, we might list the following which are at present in course of study.

1. The relationship of Maternal Rh ani-body titre to the degree to which the infant may be affected.
2. The optimum titre for induction of labour and Exchange transfusion in Haemolytic disease of the Newborn.
3. The presence of an Rh anti-body inhibitor in the serum of some individuals, its properties and behaviour.
4. The action of A.C.T.H. and Cortisone upon the anti-body titre and their effect upon an infant.

During 1953, the study of Haemolytic Disease of the Newborn has been carried further, particularly in respect of the relationship of Rhesus ani-body titre to the severity of disease in the infant. The pattern of the immunisation of the Mothers has been studied in a proportion of the 179 Rh negative Mothers. (August 1951—December, 1953) observed during their ante-natal period.

The conclusions may be briefly summarised as follows :

1. The majority of Rh negative Mothers mated to Rh positive husbands are not immunised at all during their pregnancy.
2. Immunisation may occur for the first time at any stage during the pregnancy, is rare within the first month of gestation and is commonest during the second trimester and the first two months of the third trimester.
3. There may be two, three or possibly more episodes of immunisation occurring during a single pregnancy.
4. A Mother immunised in a pregnancy, may have a subsequent uneventful one in which no episode of immunisation occurs and the infant is unaffected in spite of incompatibility. On the other hand, many Mothers usually start their subsequent pregnancy with an anti-body titre of some severity, so that if further episodes of immunisation occur, the anti-body titre may become very high with disastrous results to the infant.

During the period under review there have been 179 Mothers whose serum has contained abnormal antibodies. There were three sets of twins, and 182 foetuses have been observed. 19 of the infants were Rh negative and therefore, compatible, while there were 163 incompatible infants. Of these incompatible infants, there were 27 stillbirths (16·5 per cent.) leaving 136 incompatible live births.

Of the 136 incompatible live births, 19 have died (14 per cent.). Seven of these deaths occurred before exchange transfusions could be started, or because the infant was moribund and incapable of withstanding the trauma of the operation, while a further 18 were so mildly affected as not to require active transfusion and recovered with no treatment.

The remaining 111 incompatible live born infants were given exchange transfusion and of these, 12 died subsequently (10·8 per cent.). Blood incompatibility has been blamed in these cases, but in six instances double pathology was noted at autopsy as follows :—

1. Hydrocephalus.
1. Cerebral injuries.
2. Lung infections.
2. Prematurity.

Table I.	Numbers.	%
Incompatible Foetuses *Less* Stillbirths	163 27 =	16·5%
Incompatible Live Births	136 =	83·4%
Died (Not Exchange Transfused) Died (After Exchange Transfused)	7 12 19 =	14·0%
Surviving Infants	117 =	71·7%
Overall Mortality, Foetal and Neo-Natal Wastage	46 =	28·2%

Table I summarised the foetal and neo-natal wastage from blood incompatibility. In spite of all treatment, the overall mortality rate is appallingly high at 28·2 per cent. and the still births account for half as many deaths again as in those infants which were born alive. It would appear that of every 100 incompatible, foetuses, only 72 may be expected to survive. These findings are at variance with those who, from clinical impressions alone, tend to belittle the wastage from this disease.

So much for the mortality rates. What of the morbidity ? We have endeavoured to follow up those affected surviving infants. In this we have had some assistance from one of the Honorary Pediatricians of the Hospital staff. There has been considerable difficulty in persuading the Mothers to bring the infants back for " check up " when several months old. Of all those affected infants which we have seen at our " follow up clinic " only one has shown sequelae of the disease (mental defectiveness), while another was found to be suffering from other diseases (sclerema and blindness) not usually associated with haemolytic disease of the newborn. The majority of the remainder were carefully examined and found to be normal. Thus, of the 117 surviving infants, 115 were apparently normal, though this assumes that those infants who failed to present for follow up examination were normal. It is hoped that a number of these may be examined later.

Perth Dental Hospital Laboratory. In spite of the setback occasioned by staff shortages, the work of the Perth Dental Hospital Branch of the Public Health Laboratories expanded during the past year. A total of 4,915 histological, haematological and bacteriological examinations were made, which represents an increase of 33·19 per cent. over the 1952 figures of 3,253. The amount of work completed might have been much greater had it not been retarded by partial closure of the laboratory from September onwards.

A bacteriological technician was added to the staff in March, 1953, but had to be recalled to the Public Health Laboratories, Royal Perth Hospital, in July.

In July 1953, a trainee laboratory assistant was appointed.

In September, the senior technician was recalled to the Public Health Laboratories, Royal Perth Hospital, but exercised joint supervision over both the Histopathology Laboratories, Royal Perth Hospital, and the Dental Hospital Laboratories, an arrangement that is still continuing until additional staff becomes available. Wherever possible, work from the Dental Hospital Laboratory is brought to the Public Health Laboratories for completion.

In addition to routine and investigational work in histology, many sections were also made for histological teaching purposes, some for histological teaching sets for teaching physiotherapy students in the University ; other sections were made for histology classes and other for teaching histopathology to dental students.

The haematological work of the department consisted mainly of routine white, red and differential cell counts, haemoglobin estimations, and estimations of bleeding and clotting times.

In addition to the routine bacteriological work of culturing organisms and examining smears for Borrelia vincenti, some testing of antiseptics was carried out and sensitivity tests were made. These latter were particularly valuable as a guide to the Dental Hospital staff in their choice of antibiotics. A general check of the accuracy of the Dental Hospital's aseptic technique was also undertaken by such procedures as the swabbing of hands and instruments. Dentures sent from Wooroloo Sanatorium were routinely tested for Myco. tuberculosis and then sterilised before receiving attention from the Dental Hospital staff. A number of bacteriological preparations for student demonstrations were also made.

On the investigational side, work on the functions of Langerhans dentritic cells was continued and results were gained which added support to the conclusions already drawn from previous work done on this subject. A valuable addition to the laboratory for this work was the acquisition of a Jones " B " Hydrogen Ion Potentiometer which is an absolute necessity for a number of histochemical procedures. The most dramatic results were those obtained by the " Dopa " reactions for melanogenesis. Samples of skin from the foot and from the scalp of a white male were submitted to the " Dopa " reaction and to the methods for showing Langerhans cells. Plantar skin gave a negative " Dopa " reaction but skin from the scalp of the same subject was " Dopa " positive. The skin of both areas, however, demonstrated Langerhans dentritic cells. This work was just beginning to develop results when the emergencies referred to curtailed its prosecution.

Work on the comparison of hair. whisker and tooth innervation was completed.

Work was also begun on a study of nerve sheaths. During the course of investigations into epidermal innervation, a technique was devised which would demonstrate both the myelin sheath and the sheath of Schwann around the axis cylinders of subepithelial nerve fibres. Some years ago, T. E. Dockrill made an investigation into the function of oligodendroglia cells in the white matter of the brain. It was believed then, and is still generally believed now, that oligo cells were responsible for myelinisation. Since there are no oligo cells in the peripheral nervous system, though there is myelin, an analogous function was postulated for the sheath of Schwann cells. It can now be said, as a result of work in these laboratories, that this hypothesis is wrong. Preparations have been made in which the Schwann sheath may be seen to continue along a nerve fibre after its myelin sheath has ended, and along nerves without a myelin sheath. This would not be the case if myelinisation was a function of the Schwann cells. Hence, neither oligo nor Schwann cells are responsible for myelinisation. A more likely hypothesis is that oligo cells have a membrane forming activity analogous to that of the Schwann cells in the peripheral nervous system. This investigation was also curtailed by the emergencies cited.

Staff Changes :

Appointments—

Dr. D. H. Curnow, Senior Biochemist, 5th January, 1953.
Mr. D. F. Birch, Cadet Trainee, 16th February, 1953.
Mr. R. J. Herlihy, Cadet Trainee, 18th February, 1953.
Mr. J. C. Jansen, Laboratory Assistant, 3rd March, 1953.
Miss J. D. McPhee, Typist (transferred to K.E.M.H. 8th May, 1953), 3rd March, 1953.
Mr. A. L. Campbell, Bacteriology Technician, 9th April, 1953.
Mrs. R. Giles, Biochemist Technician, K.E.M.H., 13th April, 1953.
Miss. B. Wreathall, Biochemistry Technician, 18th May, 1953.
Mr. L. M. Loader, Messenger, 29th June, 1953.
Mr. R. Plummer, Technician (Photography), 6th July, 1953.
Mr. P. Rados, Lab. Assistant (Dental Hospital), 6th July, 1953.
Mrs. B. Schenberg, Senior Typist, 6th July, 1953.
Miss. D. J. Jenkyn, Technician (Serology), 13th July, 1953.
Mr. K. Gillieatt, Biochemist's Assistant, 14th September, 1953.
Miss G. M. Carter, Biochemistry Technician, 19th October, 1953.
Miss I. Allsopp, Temporary Laboratory Assistant (Biochemistry), 17th November, 1953.
Mr. A. Baker, Temporary Laboratory Assistant (Biochemistry) 23rd November, 1953.
Miss P. Sloane, Temporary Laboratory Assistant (Biochemistry), 25th November, 1953.
Miss L. W. Byass, Temporary Laboratory Assistant (Bacteriology), 30th November, 1953.
Miss J. Laurie, Temporary Laboratory Assistant (Bacteriology), 30th November, 1953.
Miss P. Faulkner, Temporary Laboratory Assistant (Biochemistry), 1st December, 1953.

Resignations—

Mr. J. Finlayson, Technician (Histo-pathology) 4th September, 1953.
Miss Stronach (Transferred), 8th May, 1953.

Exchanges—

Mr. C. Whitehouse from P.M.H., vice Miss C. M. Middleton, 9th March, 1953.

Persons attached for training—

Sgt. Ryan, R.A.A.F., Pearce.
Mrs. Kinsella, Busselton Hospital, 21st September, 1953 to 9th October, 1953.

Acknowledgments :

I wish to express my appreciation of the work of the staff under the difficult conditions existing and particularly of that of my senior technical assistant, Mr. A. Drummond, whose administrative and technical abilities have helped so much to overcome many of these difficulties ; of Mr. G. H. Vos and Mr. T. E. Dockrill who have so ably organised the technical work of the King Edward Memorial Hospital and Perth Dental Hospital laboratories and carried out original investigations in them, and Mrs. L. Kellett for her organisation and management of the office and its staff.

I also wish to place on record my appreciation of the collaboration of many members of the Public Works Department Architectural Division in planning the numerous laboratories already mentioned and help given by the Manager of the Royal Perth Hospital in the planning of its laboratories.

(Sgd.) W. A. YOUNG,
B.Sc., M.B., B.S., M.R.C.S., L.R.C.P., D.T.M. & H.
Director of Medical Laboratories,
Western Australia.

Appendix VI.

REPORT FROM THE DIRECTOR, TUBERCULOSIS CONTROL BRANCH.

To the Commissioner of Public Health.

Sir, I have the honour to submit a report on the activities of the Tuberculosis Control Branch for the year ended 31st December, 1953.

The spectacular drop in the death rate for the year for pulmonary tuberculosis to a figure of 6·9 per 100,000 of the population evidences the cumulative effect over the last five years of the intensified tuberculosis control campaign and the newer methods of treatment.

It is now apparent that tuberculosis is no longer a major killer, and that the disease is arrested in the majority of patients undergoing treatment. The paradox is that, although the mortality from tuberculosis is now at a very low figure, there is an increase in the morbidity (prevalence) of the disease.

This is because patients who would have previously succumbed to the disease now live on after extended medical care. This must be correlated with the still present problem of relapse of the disease, and emphasises the need for the availability of adequate numbers of beds for treatment.

The number of notifications of new sufferers during the year was the lowest for five years. It is impossible to be sure as yet that this represents a definite trend towards the goal of elimination of T.B. as there is the variable factor of intensity of case finding activities ; but the extent of the drop is very encouraging.

Records and Statistics :

As at 31st December, 1953, there were 2,882 notified sufferers of tuberculosis on the Case Register, including 120 extra-pulmonary. Four hundred and forty-two were in hospital and 1,628 on the lists of the Visiting Nurses in the metropolitan area. The prevalence of pulmonary tuberculosis was 439 per 100,000 of the population.

There were 412 notifications during the year, including 378 pulmonary and 34 non-pulmonary.

One hundred and ninety-eight names were removed from the Register during the year, including some 43 transfers, five untraceable, and 46 deaths.

Three hundred and sixty-one individuals were in receipt of the Tuberculosis Allowance at the end of the year, of whom 201 were in-patients and 160 out-patients. Two hundred and eighty were males and 81 were females.

The number of 62,000* miniature films taken during the year (an increase of 8 per cent. on the previous year), brings the total number of exposures since the Perth Chest Clinic opened in May, 1948, to 228,500.

Fourteen thousand, one hundred and twenty-one* large films were taken during the year, bringing this total for the same period to 57,553.

The death rate for tuberculosis of all forms was 7·4 per 100,000.

As it is now considered that the Case Register is reasonably accurate and up to date, the number of notified cases and the actual prevalence of the disease are included in the statistical table.

* Now includes Fremantle Chest Clinic.

STATISTICAL TABLE.

Year.	Mean Population 1,000s.	Notifications.			Number on Register.			Prevalence.		Number Receiving T.B. Allow.	Deaths.			Death Rate per 100,000	
		Pulm.	Non-Pulm.	Total.	Pulm.	Non-Pulm.	Total.	Pulm.	All Forms.		Pulm.	Non-Pulm.	Total.	Pulm.	All Forms.
1949	533	499	20	519	....	....	....	....	....	....	123	5	128	23·1	24·0
1950	559	586	18	604	2,100	....	....	376	....	515	125	3	128	22·3	22·9
1951	581	467	37	504	2,402	75	2,477	413	426	474	76	6	82	13·1	14·1
1952	602	508	49	557	2,574	94	2,668	428	443	396	75	7	82	12·5	13·6
1953	623	378	34	412	2,762	120	2,882	443	463	361	43	3	46	6·9	7·4

There has been no major departure in the work of the Branch during the year and a balanced programme was attempted as usual along the following lines :—

Prevention.
Case finding.
Medical care and isolation.
Social and economic protection.
Aftercare and rehabilitation.

PREVENTION.

The usual measures were taken in relation to investigation of living conditions of sufferers, the X-ray examination of family contacts and Mantoux testing and B.C.G. vaccination of the latter when indicated.

The Senior Visiting Nurse reported that in the metropolitan area 5,432 visits were paid by the staff of nine Visiting Nurses to 1,628 patients.

At the end of the year 106 of these were still considered to be potentially infectious, with sputum examinations positive on direct smear for the Mycobacterium tuberculosis.

In view of the number of patients requiring supervision there (133 at 31 December, 1953), a full time Visiting Nurse was appointed for the Kalgoorlie-Boulder district.

The Almoner augmented the work of the Visiting Nurses when special social problems were encountered.

Close liaison was continued during the year by the Tuberculosis Physician with the Welfare Officer of the State Housing Commission, and the Secretary of the Commission accepted a newer, simpler classification of patients to assist the Commission in helping to assess the urgency for assistance.

The Commission generally will not assist in the housing of chronic infectious T.B. sufferers.

In the last six months of the year, the Secretary of the Commission reports 49 applications where a T.B. factor was involved and 15 offers of houses were made, of which number 11 were accepted.

B.C.G. Vaccination.

B.C.G. vaccination, by recommendation of the National Tuberculosis Advisory Council, is still mainly limited to negative Mantoux reactors in those groups in which the increased resistance against T.B. which it gives for some years is considered to be the most valuable. These groups include contacts of known cases of tuberculosis ; medical and nursing personnel ; inmates of mental institutions ; the school leaving age group ; and National Service trainees. The latter two groups are considered to be emerging from that period in their lives when they enjoy a high resistance. Some 6,000 Mantoux skin tests and approximately 2,000 B.C.G. vaccinations were performed during the year ; a slight increase on the previous year's figures.

" *Morriston* " *Preventorium.*

The need for this type of institution was again apparent and the accommodation available was taxed to its limit. Fifty-two babes and infants of tuberculosis parents were admitted during the year for B.C.G. vaccination and to remove them from risk of infection. The daily average was 12, the highest number 17.

Action under Sections 293 *and* 294 *of the Health Act.*

Five persons suffering from tuberculosis in a " communicable state not conducting themselves so as to preclude infection of other persons " were directed to enter Wooroloo Sanatorium for treatment.

Two of these—one man and one woman—did not comply with the order. These individuals were adjudged declared patients by the Magistrate and directed to enter Wooroloo Sanatorium for a period of twelve months.

Thirty-two of these were old patients who had failed to attend for check-up (two at the request of the Repatriation authorities) ; nine were necessary follow-ups of micro films showing abnormalities suspicious of T.B. ; one was a migrant who produced an unsatisfactory film on arrival ; and one was a contact who did not report when requested. Proceedings were taken also against two persons who did not attend. They were fined by the Magistrate and subsequently reported for examination.

Forty-eight persons were required " to submit to X-ray examination of the chest for tuberculosis."

CASE FINDING.

The maximum effort possible was made within the bounds of personnel and equipment available.

The priority group system was continued, with concentration on " suspect " patients referred by private practitioners, X-ray of hospital in and out-patients, contacts of sufferers, and special groups (e.g., migrants).

Compulsory mass X-ray surveys of country centres were continued during the year and the following centres were examined ; Albany (completed), Geraldton, Northampton, Mullewa, Bunbury and Busselton,

Cases referred by Medical Practitioners.

1. *Metropolitan.* The number reporting was not quite 7,000, slightly less than in 1953.

This group continues to be the most important one for the number of active T.B. sufferers discovered per number X-rayed, although, as the Tuberculosis Physician points out, the incidence is dropping, only three active sufferers being found in every 200 examined compared with three per 100 in 1949 and 1950.

The findings suggest that practitioners are gradually " weeding out " suspect cases in their respective practices.

2. *Country.* It is here that the biggest increase of work for the Clinic medical staff has occurred.

Attention has been paid, in conjunction with the Medical Department and the State X-ray Engineer, to gradually improving X-ray equipment in country hospitals where it was below standard, and country practitioners have been further encouraged to arrange X-ray examination of suspect patients.

Films are now received from over 52 hospitals ; as for example, from the large centres—Collie 536, Geraldton 532, and Albany 345.

A total of over 4,500 films was referred to the Clinic, which is double that of the previous year, and exactly comparable to the number of large film examinations made for Perth metropolitan practitioners. The surprisingly high number of 21 patients with active pulmonary tuberculosis was discovered as a result, with 51 " suspect " requiring further observation, and 393 other abnormalities of significance.

It is felt from the above, considering the balance of population, that the rural community is now as equally catered for as the urban.

Hospital In-Patient and Out-Patient Group.

The majority of admissions to the Royal Perth and St. John of God Hospitals continue to be X-rayed and the Fremantle Hospital is increasing its coverage of this group.

Out-Patients are examined at the Royal Perth Hospital, but as yet it has not been possible to expand the department at Fremantle to include this group.

The Medical Superintendent of the Royal Perth Hospital, Dr. Roland Anderson, examined micro films of over 8,500 patients with the Tuberculosis Physician, who reports as a result 13 active cases of pulmonary tuberculosis were discovered amongst those referred to the Perth Chest Clinic for follow-up, apart from 11 retained in Hospital.

Nearly 4,000 micro films of in-patients were examined at the St. John of God Hospital, Subiaco, by Chest Clinic staff. Two extensive cases of tuberculosis disease and several suspects for follow-up were found.

Not quite 2,500 films were taken at Fremantle Hospital.

Migrants.

With a decreasing tempo of migration during the year, only 3,300 films of assisted migrants were submitted for re-check by the Commonwealth Health Department. Again, the value of re-examination of the supposedly normal X-ray films was evidenced by the fact that six active cases of tuberculosis were discovered and five others are under investigation.

One individual was deported by the Commonwealth authorities as a result of tuberculosis discovered in this manner.

Apart from this, a further 1,436 out of 13,791 new arrivals were X-rayed and four individuals with active tuberculosis were admitted to hospital as a result.

The coverage of this group is far from complete and steps are being taken to try to improve the position.

A follow-up of earlier migrants, who had some evidence of disease, arriving earlier in Australia (since 1947) resulted in a further 18 notifications.

Mass Radiography.

Over 62,000 exposures on miniature film were made ; 41,000 in the metropolitan area, including 14,000 volunteers, and 21,000 in the country.

The justification of compulsory surveys in country centres is evidenced by the discovery of an incidence of active disease approximating, in most cases, to that in the metropolitan area ; e.g., metropolitan area 2·2 per 1,000 ; Albany 2 per 1,000 ; Bunbury 3 per 1,000 ; Busselton 2 per 1,000.

Medical Care and Isolation.

There has been no new departure in treatment this last year.

Isoniazid has fulfilled the expectations raised in 1952 and is used in combination with the drugs previously found effective—Streptomycin and Para-aminosalicylic acid.

It has now, however been found necessary to test the tuberculous organism for development of resistance against the different drugs. This, however, may be correlated with the fact that the T.B. germ may vary in its virulence in different organs of the body or even in different locations in the one organ, e.g., the lung ; and this may explain clinical response when a specimen shows T.B. germs resistant to antibiotic or drug.

The Medical Superintendent of the Wooroloo Sanatorium reports excellent results of treatment with a rate of 90 per cent. discharged as " arrested " or Inactive, but the problem of relapse is still with us and the re-admission rate is 30 per cent. of admissions.

An analysis of the latter, in relation to true relapse as against re-admission of chronic cases and a comparison of results of surgical as against medical treatment, has not as yet yielded a conclusive result.

The average stay in Wooroloo, 42 weeks, remains the same. This is much lower than most first-class tuberculosis hospitals abroad. It is conditioned in this State by the need for beds, but is undoubtedly one of the causes of relapse—insufficient time being allowed for slow up-grading—and so this results in the " vicious circle " of re-admissions.

Royal Perth Hospital.

An even more limited number of beds for investigation and treatment was available and, as at the end of the year, these comprised three male and six female and nine for surgical patients.

At the beginning of the year there were 22 T.B. patients in Hospital—15 medical and seven surgical.

There were 141 admissions during the year, including 59 transfers from Wooroloo Sanatorium for surgery.

There were 48 discharges to home and 104 transfers to Wooroloo and other hospitals for continuation of treatment.

Repatriation General Hospital.

The same number of beds, namely 17, were available for the treatment of civilian females and 33 patients were treated during the year.

Princess Margaret Hospital.

There were seven admissions of children with significant primary or progressive pulmonary tuberculosis, the most of these under the age of three years, and all of them responded favourably to treatment.

Three older children were admitted for observation, but discharged without need for treatment.

The amount of non-pulmonary tuberculosis was less than the previous year, there being only four admissions for tuberculous adenitis and two of T.B. meningitis.

The only deaths during the year were of two children from tuberculosis meningitis.

Tuberculosis in children is now definitely becoming uncommon in this State—as a result of control measures for adults and the elimination of bovine tuberculosis from dairy herds.

Out-Patient Investigation and Treatment.

The appointment system at the Perth and Fremantle Chest Clinics has been well-received by patients and has cut down the number of Clinic visits and the patient is now not brought back to Clinic if X-Ray examination has proved satisfactory.

The amount of bacteriological investigation and follow-up arranged through the Public Health Laboratories is still considerable, one added factor being the necessity to arrange bacteriological reports to aid in the assessment of eligibility for the Tuberculosis Allowance.

	No. of Tests.	Individuals.
Sputum examinations	1,271	381
Positive results for m. tuberculosis	204	73
Gastric contents (cultures and/or guinea pig inoculations)	405	139
Positive results (cultures and/or guinea pig inoculations)	154	60

SOCIAL AND ECONOMIC PROTECTION OF SUFFERERS.

Again in accord with cost of living rise, the Tuberculosis Allowance rates were adjusted on 29-10-52 to :—

	£	s.	d.
Married Sufferer with dependendent wife	9	2	6
Sufferer without dependents—			
(a) while hospitalized free of charge	3	10	0
(b) when not in hospital	5	12	6
Sufferer whose only dependent is a child or children	5	12	6
Each dependent child	0	10	0

The adjustment confirms the fact that the Commonwealth Government means to pursue the policy of providing adequate financial security to sufferers from active pulmonary tuberculosis to enable them to undergo treatment.

AFTER-CARE.

Rehabilitation.

A good framework for rehabilitation measures exists in this State.

The Senior State Medical Officer of the Commonwealth Social Services Department works in close liaison with the Tuberculosis Physician, and one of his officers also visits the Sanatorium regularly.

Eighty-five patients were investigated and received some assistance and 27 were accepted for part-time or full-time training during the year.

The Tuberculosis Allowance is only available for patients on discharge when there is real risk of breakdown of disease, so, where the Allowance cannot be continued, the individual may be transferred to the Commonwealth Rehabilitation and Training Allowance.

The State is, as usual, indebted to the volunatary work of the Tuberculosis Association.

The Sheltered Workshop in Perth employed 36 ex-patients in gradually increasing hours of work during the year, of whom 25 left the Factory for further employment, which they were then considered capable of undertaking. There were 12 ex-patients in employment at the beginning and 11 at the conclusion of the year.

The " Colony " project at Linley Valley, adjacent to the Sanatorium, as mentioned in the report of the Medical Superintendent of Wooroloo, has now been completed in regard to the factory installation, and is indeed well-equipped with 12 electrically operated machines and presses, and needs but the provision of a further four or five houses for family units to complete it as a Model Colony Centre for the rehabilitation of the tuberculous.

DEVELOPMENTS.

The Fremantle Chest Clinic was opened in May to cater for the demands of the rapid expansion in that district. The Clinic is proving most successful and it is expected its work will gradually increase, as proved the case with the Perth Chest Clinic.

A tender was accepted at the end of the year for the erection of the extensions to the Perth Chest Clinic and it is hoped this addition will be completed during 1954 to relieve the congested conditions existing at present.

Considerable work has been carried out during the year in association with the Principal Architect in helping the completion of the plans for the 200-bed Perth Chest Hospital and it is hoped that tenders will be called for the erection of this Hospital early in 1954.

CONCLUSION.

Although much further work remains to achieve the goal of eradication of tuberculosis, it appears that the corner has been turned and the expenditure of funds in the tuberculosis control campaign is being amply repaid by a saving in life and manpower, apart from the happiness of the individuals restored to health.

The Reports of the Tuberculosis Physician and the Medical Superintendent of the Wooroloo Sanatorium are attached.

My thanks are again due to all members of the staff of the Branch and the Department who have assisted our public health project ; and particularly to you, sir, for your encouragement of our work.

ALAN KING, B.Sc., M.B., B.S., F.C.C.P.
Director, Tuberculosis Control Branch.

APPENDIX VII.

REPORT OF THE TUBERCULOSIS PHYSICIAN.

To the Director,
Tuberculosis Control Branch.

Sir, I have the honour to submit a report for the year ended 31st December, 1953.

PERTH CHEST CLINIC.

Out-Patient Clinics :

These were held three times each week.

Number of attendances	3,738
Average attendance per Clinic	26
Number of full-size x-rays taken	13,326

Attendances for the year are lower than for 1952, and this may have been influenced by the new appointment system which has been in operation since early last year.

Artificial Pneumothorax Clinics :

Three Clinics are held each week.

Number of patients attending for refills as at 31st December, 1953		26
Unilateral Artificial Pneumothorax	24	
Pneumoperitoneum	1	
Pneumoperitoneum and Artificial Pneumothorax	1	
Number of screenings		1,492
Number of refills		1,391

Mass Radiography.

Perth Chest Clinic (*Static Unit*) *:*

Number of 35 mm. exposures		31,741
Groups x-rayed include the following :		
Private patients (routine)	2,149	
Armed Services	2,688	
Commonwealth Public Service Entrants	1,009	
State Public Service Entrants	1,693	
K.E.M.H. patients	1,221	
Contacts	3,605	
Miscellaneous Groups	3,381	
Immigrants	994	
Volunteers	13,774	
National Service Trainees	1,227	

The number of retakes ordered on full-size film was 1,034, representing 3·3 per cent. of the total.

Mobile X-Ray Unit (*Metropolitan Area*) *:*

Number of 35mm. exposures		4,294
Groups x-rayed were as follows :		
Claremont Mental Hospital	1,477	
University of Western Australia	1,129	
Permanent Army (Swanbourne)	234	
Immigrants (Northam)	405	
State Engineering Works	1,007	
Department of Supply (Swanbourne)	42	

Mass Radiography Findings.

Cases of pulmonary tuberculosis diagnosed :		70
Admitted to hospital	46	
Under out-patient observation	24	
Suspect cases under out-patient observation		81
Incidence of proven tuberculosis		0·22%
Non-tuberculous abnormalities diagnosed		141

Cases Referred for X-ray by Private Practitioners.

Number of patients referred (including 2,149 miniature films and 4,636 17 in. x 14 in. films)			6,785
Normal x-rays		6,003	
Cases of pulmonary tuberculosis diagnosed		95	
Admitted to hospital	66		
Under out-patient observation	29		
Suspect cases under out-patient observation		90	
Incidence of proven tuberculosis			1·4%
Non-tuberculous abnormalities diagnosed		597	

The table below shows the gradual decline in the incidence of tuberculosis in this group of patients since 1949–50.

Year.	Incidence of proven tuberculosis disease.
1949	2·7%
1950	3·3%
1951	2·0%
1952	1·7%
1953	1·4%

Mantoux Tests and B.C.G. Inoculation (Metropolitan Area).

National Service Trainees :		
Total number of Mantoux tests performed		2,210
Positive reactions	1,063	
Negative reactions	1,133	
B.C.G. Inoculations		1,133
Schools :		
Total number of Mantoux tests performed		1,032
Positive reactions	488	
Negative reactions	544	
B.C.G. Inoculations		539
Contacts (Perth Chest Clinic) :		
Total number of Mantoux tests performed		1,291
Positive reactions	464	
Negative reactions	809	
B.C.G. Inoculations		218
Miscellaneous (Hospital Staffs, etc.) :		
Total number of Mantoux tests performed		246
Positive reactions	159	
Negative reactions	86	
B.C.G. Inoculations		86
University :		
Total number of Mantoux tests performed		339
Positive reactions	236	
Negative reactions	103	
B.C.G. Inoculations		103
Total number of Mantoux tests carried out by Visiting Nurses		5,118
Total number of B.C.G. Inoculations in Metropolitan Area		2,079

Royal Perth Hospital—Routine Chest X-ray of New Patients.

All new patients applying for treatment have a 35mm. film of the chest ; those patients requiring a full-size film are referred to the Perth Chest Clinic.

Number of patients referred		133
Cases of Pulmonary tuberculosis diagnosed		17
Admitted to Hospital	13	
Under out-patient observation	4	
Suspect cases under out-patient observation		16
Non-tuberculous abnormalities diagnosed		13

Fremantle Hospital.

The Monday afternoon Clinic was conducted from 1st January, 1953, to 8th May, 1953, when its functions were taken over by the Fremantle Chest Clinic.

The following figures relate to the abovementioned period :—

Out-Patients :

Total number of attendances	287
Cases referred by private practitioners	85
Attendances of known cases of tuberculosis	120
Volunteer x-rays	23
Contact X-rays	33
New Cases of tuberculosis discovered	1

Artificial Pneumothorax Clinic :

Number of cases receiving pneumothorax	8
Unilateral pneumothorax	8
Total number of refills given	66

In-Patients (from 1st Januray, 1953 to 31st December, 1953) :

Pulmonary tuberculosis	19
Extra-Pulmonary tuberculosis	3

Mantoux and B.C.G. :

Total number of Mantoux Tests performed		44
Mantoux positive	13	
Mantoux negative	31	
Total number of B.C.G. inoculations given		23

Routine X-ray of Patients Admitted to Hospital :

New patients admitted to the Fremantle Hospital have an x-ray of the chest when practicable. Suspect cases of tuberculosis till 8th May, 1953, were referred to the hospital Chest Clinic. Subsequent to the opening of the Fremantle Chest Clinic, the hospital has investigated its own suspects in consultation with Dr. Harris.

The figures below apply to cases referred to the Fremantle Hospital Chest Clinic.

Total number referred to Clinic	33
Cases of pulmonary tuberculosis diagnosed	*Nil*
Other conditions diagnosed by x-ray and clinical findings	6

Fremantle Chest Clinic.

The following figures refer to the period 13th May, 1953 to 31st December, 1953 :—

Out-Patients :

Total number of attendances	413
Average attendance per clinic	7
Total number of full-size x-rays	795

Artificial Pneumothorax Clinic :

Total number of patients attending for refills	8
Unilateral artificial pneumothorax	8
Total number of screenings	96
Total number of refills	89

Mantoux and B.C.G.:

Mantoux tests		438
Mantoux positive	309	
Mantoux negative	119	
Mantoux not read	10	
B.C.G. given		87

Cases Referred by Private Practitioners.

Total number of cases referred		504
Normal x-rays	442	
Total number of abnormalities of all sorts diagnosed	62	
Cases of tuberculosis diagnosed and admitted to hospital		2
Cases of tuberculosis diagnosed and under out-patient observation		1
Suspect cases undergoing further observation		7
Incidence of proven tuberculosis		0·6%

Mass Radiography.

Total number of 35mm. exposures		3,272
Volunteers	2,324	
Armed Services	82	
Merchant Navy	92	
Public Service Candidates	97	
K.E.M.H. patients	74	
Contacts	485	
Migrants	118	
Miscellaneous groups	6	
Retakes on large film representing 2·9 per cent. of the total		96
Cases of pulmonary tuberculosis diagnosed		4
Admitted to hospital	3	
Undergoing out-patient observation	1	
Suspect cases undergoing further observation		6
Incidence of proven tuberculosis		0·12%
Non-tuberculosis abnormalities diagnosed		76

F. E. HEYMANSON,

30th April, 1954.

Tuberculosis Physician, Tuberculosis
Control Branch.

Appendix VIII.

ANNUAL REPORT FOR WOOROLOO SANATORIUM, 1953.

The Director,
Tuberculosis Control Branch,
Perth Chest Clinic,
17 Murray Street,
Perth.

I have the honour to present the Annual Report for Wooroloo Sanatorium for the year ending 31st December, 1953.

TREATMENT.

During 1953 a routine course of chemotherapy was adopted for all patients. This consisted of Streptomycin, 1 gram twice weekly, P.A.S., 12 grams six days per week, and Isoniazid, 6 to 8 milligrams per kilogram of body weight daily. In exceptional circumstances the dose of Streptomycin was increased to ½ gram or 1 gram daily for a short period, after which the routine was resumed. Under this treatment our results were better than in any previous year, and are indicated below :—

Total number of patients treated in Sanatorium during 1953	515
Chemotherapy (routine three drugs) administered to	487

Results.

Conservative plus three drugs total—377.

Sputum converted	253
Sputum still positive :—	
Discharged patients	24
Inpatients	41
Treatment under three months duration	59

Active Treatment Combined with Chemotherapy—110.

Sputum converted	108
Still positive	2

In addition to bacteriological conversion, there was, in practically every case, an improvement in the clinical condition of the patient and in the radiological appearances of the disease, and it is felt that this combination is the most powerful agent in our armamentarium against the Tubercle Bacillus.

Active Treatment.

Active treatment was carried out on all cases in whom the indications were present, and this assisted materially in the conversion of sputum, and arrest of the disease.

The details of active treatment carried out at the Sanatorium, and at Royal Perth Hospital on Sanatorium patients are as follows :—

Collapse Therapy—

Modified thoracoplasties with plombage	27
Artificial pneumothorax inductions or attempted inductions	13
Satisfactory artificial pneumothoraces established	8
Thoracoscopies	8
Complete pneumolyses	7
Pneumothoraces impossible or abandoned because of inoperable adhesions	5
Phrenic crushes	5
Phrenic resections	4
Pneumoperitoneums induced	15

Resections—

Segmental	3
Upper Lobe	12
Upper lobe plus plombage	7
Lower Lobe	3
Pneumonectomies	5

Other Operations—

Removal of plomb	8
Thoracoplasties (post-pneumonectomy)	3
Unroofing of empyema	2
Drainage of extrapleural abscesses	2
Thoracotomy and drainage of empyema	1

Miscellaneous procedures carried out in the Sanatorium theatre were as follows :—

Artificial pneumothorax refills	350
Pneumoperitoneum refills	220
Aspirations	70
Bronchoscopies	88
Minor operative procedures	40

As in previous years, cases for major surgical procedure were transferred to Royal Perth Hospital, and remained there for the early part of their post-operative care. Adhesion sections, thoracoscopies, phrenic nerve operations, and bronchoscopies were carried out at the Sanatorium.

MEDICAL STATISTICS.

Admissions	306
Discharges	273
Deaths	17
Average stay in hospital of discharged patients—	
Males	43 weeks
Females	41 weeks

The number of miners and ex-miners admitted to the Sanatorium showed a considerable reduction in comparison with the number admitted during 1952, one obvious reason being the mass survey carried out in Kalgoorlie during 1952. There were in all 26 miners or ex-miners admitted, as against 49 in 1952.

Of the 306 admissions, 95 (31 per cent.) had been in Wooroloo Sanatorium on one or more previous occasions, and 23 (7·5 per cent.) had previously been in-patients of other tuberculosis institutions. Of the new cases admitted to the Sanatorium, the majority were referred from the Chest Clinic as a result of mass radiography surveys and X-ray of cases referred by private practitioners. The actual figures relating to the exact method of discovery are as follows :—

Mass Survey—	
Metropolitan	67
Country	23
Private Practitioners via Chest Clinic	43
R.P.H. referrals	18
Other metropolitan hospitals	4
Country hospitals and medical practitioners via Chest Clinic	38
Commonwealth Health Laboratory survey	4
Referred from other States	11

Re-admissions.

Of the 95 re-admissions, 62 were first re-admissions, 26 second, and 7 third re-admissions. There were 35 re-admissions within one year of previous discharge. Of these, two patients were re-admitted twice during the year. The average stay in hospital on the previous admission of these 35 cases was 11 months, and their treatment when previously in hospital, together with the nature of their disease and their condition on previous discharge are listed below :—

Re-admissions within One Year—33.

(a) *Conservative Treatment*—23.

Treatment.	Type of Disease.	Status on Discharge.		
		Arrested.	Active.	
			Irreg. Disch.	Approved.
Conservative treatment plus Chemotherapy	Minimal	2	....	....
	Moderately advanced	3	1	3
	Advanced	12	....	2

(b) *Active Treatment.*

Plombage ; recurrence of activity	3
Plombage ; infection in plomb space (underlying disease controlled)	1
Segmental resection ; relapse in remaining segments	1
Upper lobectomy ; late bronchial fistula	1
Upper lobectomy ; activity in contralateral lung	1
Upper lobectomy ; infected extrapleural space	1
Pneumonectomy ; persistent pleural sinus	1
Pneumonectomy ; relapse in contralateral lung	1

Re-admissions between One and Five Years—53.

There were 53 readmissions between one and five years after previous discharge. Of these, five only were young people with minimal or nearly minimal disease who had previously been treated conservatively, three with chemotherapy and two without. One young man was admitted for an elective resection of a tuberculoma which had undergone no change since his previous admission. Three were readmitted for reinvestigation and assessment for pension purposes, and were found to be inactive, and one was admitted for observation and rest during pregnancy. Two persons with bilateral artificial pneumothoraces were admitted for observation and chemotherapeutic cover during re-expansion of their lungs, and six readmissions were due to relapse after major surgical procedures as indicated below :—

Thoracoplasty with relapse in contralateral lung	3
Plombage with activation in underlying lung	1
Upper lobectomy with residual unstable disease in contralateral lung	1
Infected extrapleural space after pneumonectomy	1

Thirty of the cases (57 per cent.) were over 40 years of age, and 21 (40 per cent.) were over 50. Of the cases treated conservatively on previous admissions, 32, when previously admitted, had advanced or moderately advanced bilateral disease, and a further three had moderately advanced unilateral disease. Fifteen of these 35 cases received various courses of chemotherapy during their previous stay in hospital.

Re-admissions after Five Years—9.

Discharges.

There were 273 patients discharged and of these 226 were arrested and 23 inactive. The disposal of the 24 active cases was as follows :—

Transferred to other institutions	9
Discharged home to approved conditions	12
Irregular discharges	3

In addition to the active " irregular " discharges, 13 further cases which were considered arrested, but whose treatment was incomplete, left the Sanatorium against advice.

In addition to the above inactive and arrested cases, two cases regarded as non-tuberculous were discharged.

A further considerable fall in the death rate was an indication of the effect of modern methods of treatment, and also reflected to a certain extent the stage of disease at which the majority of patients were admitted to the Sanatorium.

STAFF.

Once again it is my pleasure to record the high standard of work done by the medical staff throughout the year. Without their wholehearted support the treatment listed above would not be possible. In particular, I desire to record my appreciation of the loyal support of my assistant superintendent, Dr. D. D. Letham.

Dr. Claude Langman resigned from the staff in March, and Dr. G. R. Hadfield acted as a temporary medical officer to replace him until June when he took up residence at Royal Perth Hospital.

In October Dr. J. R. Carter joined the staff and to date has rendered conscientious and valuable service as a senior medical officer.

The surgical treatment of patients has again been in the capable hands of Mr. F. J. Clark, assisted in the latter part of the year by Dr. Allan Bailey, whose visits to the Sanatorium as a consultant surgeon have added considerably to the interest of our clinical reviews. We are grateful to Mr. Clark, Dr. Bailey, and their anaesthetists, Drs. G. R. Troup and D. R. Wilson, for their continued assistance.

Throughout the year Dr. K. Barnden Brown, and Dr. H. M. Hill have helped us in the specialist fields as ophthalmological and orthopaedic surgeons respectively, and we are grateful for their continued assistance.

Dr. T. Anthony was appointed honorary consultant skin specialist, and promises to be of major assistance in controlling our patient's dermatological problems.

The nursing staff under Matron Lochhead has continued to render faithful service, and I am grateful to the matron and her trained staff for the high standard of nursing which has been maintained.

REHABILITATION.

A close liaison has been maintained with the Rehabilitation section of the Department of Social Services as a result of which every patient requiring vocational training is catered for from the beginning of his Sanatorium treatment until his discharge, and subsequently, until his final return to fulltime employment. It is a pleasure to place on record our indebtedness to Dr. Tomlinson and his rehabilitation officers, Mr. D. Williams and Mr. P. Perry. without whose wholehearted co-operation such a state of affairs could not exist.

Miss Jocelyn Perry resigned from the position of Occupational Therapist in December, after three years valuable service, and to date her place has not been filled. The work of the department has been carried on by the rehabilitation officer, Mr. James Grady, who was appointed to this position in February, and who as such, has been of considerable help to the patients and staff of the institution.

Miss Burgess, the Red Cross handcraft worker, completed her term of office at the Sanatorium and was recalled by her society, which was unfortunately unable to replace her. This aspect of diversional therapy consequently suffered, as the Occupational Therapist was unable to untertake the additional work involved.

LABORATORY.

Dr. Incze, the pathological registrar, rendered valuable service to the institution throughout the year until December when he took leave of absence to proceed to America for further study. Miss E. Bothwell resigned in May after 10 years of highly efficient service, and her place as laboratory technician was taken by Mr. E. Doilov.

During the year, in addition to the routine investigation of sputum and gastric contents by direct smear examination, concentration, culture and guinea pig inoculation, Streptomycin and Isoniazid resistance tests were continued, and a number of additional pathological and biochemical tests were undertaken, including Blood urea and sugar estimations, fractional test meals, C.S.F. investigations, blood pro-thrombin estimations, and antibiotic sensitivity tests on organisms other than tubercle bacilli.

Details of investigations of material for tubercle bacilli are listed below, together with miscellaneous tests carried out in the laboratory. Further details of these are listed in the appendix to this report.

Sputum Examinations—	
Direct Smears	2,269
Concentrations	181
Culture smears	1,071
Pleural fluids examined	46
Cultures on Loewenstein Medium—	
Sputum	3,808
Gastric contents	161
Pleural fluid	27
Discharges from sinuses, etc.	27
Urine	68
Faeces	2
Guinea Pigs inoculated	59
Resistance Tests—	
Streptomycin	130
Isoniazid	344
C.S.F. Examinations—	
Cell count	77
Sugar	16
Chlorides	8
Miscellaneous Investigations—	
Blood, Urine, Faeces, etc.	1,715

X-RAY.

Dr. D. Karczub, after three years of conscientious service as X-Ray technician, resigned from the staff to take up a position as radiologist in the Commonwealth Health Laboratory, and the technical work in the X-Ray department has been carried on by Mr. D. Griffiths.

Details of X-Ray examinations carried out are as follow :—

Chest films	3,314
Screenings	850
Tomograms	110
Spinal and Pelvic X-Rays	118
Bronchograms	20
Sinograms	6
Extremities	120
Abdominal X-Rays	22
Pyelograms	11
Cholecystograms	6
Dental X-Rays	18
Skulls and Sinuses	22

ADMINISTRATION.

I am grateful to the secretary, Mr. J. L. Cross, and his assistants for their ready co-operation and help throughout the year.

BUILDINGS.

Eight further houses were completed for the accommodation of married members of the staff, and have helped in the solution of our accommodation problems.

The Refractory ward was completed and has been used for the disciplinary control of recalcitrant cases who would otherwise constitute a problem in management, either as regards the welfare of their fellow patients in the Sanatorium, or as regards the public health if they were not detained in the institution.

Work has commenced on the installation of a new sewerage system, which when completed will fulfil the requirements of the institution much more effectively than the present inadequate system.

LEPROSARIUM.

One patient was discharged with her disease arrested, and one was repatriated to his home country. There was one admission during the year.

Sulphone treatment has continued, and even the most serious cases continue to show an improvement as a result of its exhibition. In addition, Isoniazid is being used, but as yet its value cannot be assessed with certainty.

ENTERTAINMENTS.

Throughout the year the patients and staff enjoyed a series of talks and recitals of Everyman's Music, arranged by the Adult Education Board, and also were entertained by a number of visiting concert parties and amateur dramatic societies. Our thanks are due to these various societies for their generosity, and also the Red Cross who assisted with the payment of the subscription to the Adult Education Board, and also provided transport for artists and dramatic groups when required.

LINLEY VALLEY (W.A. TUBERCULOSIS ASSOCIATION).

The installation of power machinery was completed in the Tinsmithy at Linley Valley, and a further cottage was erected for accommodation of a Colonist family.

Eleven ex-patients commenced work in the factory, and five previously employed were discharged to fulltime work in the general labour market. Four patients whose disease relapsed were re-admitted to the Sanatorium for treatment.

In addition to the ex-patients accommodated in the Colony, ten male and five female in-patients were employed in the Colony on a part-time basis.

The appointment of a permanent factory manager on full-time marked a further advance in our programme, and a considerable increase in the volume of work performed in the tinsmithy served as an indication of the increasing value of Linley Valley in the Rehabilitation scheme.

Our aim now is the erection of a sufficient number of houses to provide adequate accommodation for all cases requiring Colony rehabilitation. Suitable work for them is provided by the factory in which working conditions are little short of ideal.

CONCLUSION.

In conclusion I desire to record my thanks for the help and encouragement I have received from you Sir, and of the constant co-operation from the members of the staff of your department ; it is also my wish to express my appreciation for the ready support which I have always received from the Commissioner of Public Health, and from the Under Secretary and the Assistant Under Secretaries of the Department of Public Health.

H. R. ELPHICK, MB., B.S.
Medical Superintendent.

APPENDIX.

Details of miscellaneous laboratory investigations :

Haematological ;	
Haemoglobin estimations	255
Red blood counts	96
White blood counts	267
Differential white counts	231
Platelet counts	12
Sedimentation rates	29
Reticulocyte counts	12
Haematocrits	16
Bleeding, Clotting times	11
Prothrombin time	69
Bichemical ;	
Blood and sugar estimations	15
Blood urea estimations	5
Test meals	16
Bacteriological ;	
Cultures on Agar, Serum Agar, McConkey's Agar and Broth :	
Sputum	33
Urine	90
Pleural fluids	37
Discharges from sinuses, etc.	54
Faeces	7
Urethral and Vaginal smears	18
Throat swabs	5
Anti-Biotic Sensitivity Tests	49
Urine examinations (Microscopic and Biochemical)	263
Skin scrapings (Leprosy)	40
Skin scrapings (others)	28
Post mortem examinations	13
Sections prepared	150

APPENDIX IX.

WESTERN AUSTRALIA.

PULMONARY TUBERCULOSIS.

Year.	Population in 1,000's.	Notifications Received.	Incidence Rate per 100,000 Population.	Deaths Registered.	Mortality Rate per 100,000 Population.
1911	287	259	90·2	190	66·2
1912	301	429	142·5	220	73·1
1913	313	424	135·5	206	65·8
1914	323	353	109·3	229	70·9
1915	321	336	104·7	233	72·6
1916	313	511	163·5	225	71·9
1917	306	464	151·6	217	70·9
1918	308	432	140·5	245	79·5
1919	320	467	145·9	289	91·6
1920	330	442	133·9	259	78·4
1921	334	424	126·9	277	82·9
1922	341	387	113·8	256	75·1
1923	351	361	102·8	216	61·5
1924	363	381	104·6	228	62·8
1925	373	403	108·4	259	69·4
1926	381	415	108·2	252	66·1
1927	392	409	104·3	231	56·4
1928	408	395	96·8	282	69·1
1929	421	400	95·0	245	53·4
1930	429	569	132·6	218	50·8
1931	432	372	86·1	223	51·6
1932	435	339	77·9	203	46·7
1933	439	295	67·2	207	47·2
1934	442	287	64·9	218	49·3
1935	447	270	60·4	210	47·0
1936	452	338	74·8	193	42·7
1937	457	239	53·0	172	37·6
1938	464	247	53·2	177	38·1
1939	470	202	43·0	179	38·1
1940	473	231	48·8	181	38·3
1941	474	154	32·5	185	39·0
1942	477	113	23·7	175	36·7
1943	477	273	57·3	144	30·2
1944	481	219	45·4	134	27·9
1945	488	271	55·5	149	30·5
1946	493	343	69·6	163	33·1
1947	503	372	74·0	128	25·5
1948	515	325	63·1	157	30·5
1949	533	499	93·6	123	23·1
1950	559	586	104·8	129	23·1
DEATH CLASSIFICATIONS ACCORDING TO 6TH (1948) INTERNATIONAL LIST.					
1950	559	586	104·8	125	22·3
1951	581	467	80·4	76	13·1
1952	602	508	84·4	75	12·5
1953	623	378	60·6	43	6·9

Appendix X.

THIRD AND FINAL ANNUAL REPORT OF THE CANCER RESEARCH UNIT, DECEMBER, 1953.

The final year's work of the Cancer Research Unit consisted mainly of :—

(a) Consideration of plans for the future ;
(b) Experimental investigation of Cancer Treatments ;
(c) Investigations of Thermal properties of mouse tumours ;
(d) Experiments on selective activity of tumour tissue ;
(e) Breeding of mice ;
(f) Publications.

(a) *Future Plans.*

It was at first intended to continue and commemorate Dr. Gye's work by the addition of three new rooms to the present building in Smyth Road and plans were drawn up. Various difficulties were encountered, not the least being the ultimate desire of the Department of Agriculture to resume the rooms at an unspecified date. Various meetings were held and a Research Institute was formed—on paper, but the practical difficulties of housing and personnel proved serious and the plans were finally put into cold storage until a Medical School could be founded or a Professor of Pathology appointed. Advice was sought from the Rockefeller Institute, New York, as to the feasability of carrying out the very extensive programme of proposed research left by Dr. Gye. The answer received from Professor Peyton Rous was quite definite in advising the postponement or abandonment of the plan, until more staff and permanent buildings could be obtained. It proved impossible to find a medically qualified research assistant to replace Dr. Paton and it was therefore decided to finish the experiments already under way but not to expand. The matter was finally brought to a head at the end of November when the Department of Agriculture requested the return of the laboratory to them on 1st January.

(b) *Experimental Investigation of Cancer Treatments.*

1. A long observational experiment lasting seven months was carried out to gain a knowledge of the natural history of the RIII sporadic tumour of the breast, now that the mice are firmly established in Australia. The results can be used as a base line in assessing the effect of treatment. The report on this experiment brings out well how early diagnosis, without treatment, gives an apparent but fallacious increased expectation of life. This must be remembered in assessing the effect of early treatment in man or animals.

2. Experimental and clinical investigations were carried out on tri-ethylmelamine (T.E.M.).

   Mice with spraodic mammary carcinoma were treated and paired with untreated mice having tumours of comparable size and site. No appreciable action of the drug was observed in mice. Various human patients were treated at the same time but no spectacular results were obtained. Slightly better results (temporary only) were obtained in leukaemias than in carcinoma of the breast.

3. An experiment with a new antiviral antibiotic (acerine) was planned but there was delay in receiving the material and it was not possible to finish it.

(c) *Investigation of Thermal properties of Mouse Tumours.*

Further experiments on the relative activity of the various mouse tumours at —10°, —28°, and —79° were done and graphs obtained. In most cases activity increases with length of freezing time at —79° and decreases at —28° and —10°. In all cases activity after a week's freezing is greatest at —79°. The C48 tumour was mostly used but the other chemically induced sarcomas in other strains of mice, showed similar curves. The major increase in activity occurs on the third day.

(d) *Experiments on Selective Activity of Tumour Tissues.*

Frozen and fresh, implanted into different parts of the body in males and females were planned and begun, using the RIII sporadic carcinoma. The site studied were intra-mammary, intra-peritoneal, back of head and base of tail. These experiments were not finished when the laboratory closed at the end of the year and insufficient information was gained from them on which to base any conclusion.

(e) *Breeding of Mice and Conservation of Tumours.*

Laboratories, in Melbourne, Adelaide and Sydney have been supplied with various strains of mice and with chemically induced and sporadic tumours. Dr. Bennetts has now taken over the responsibility of carrying on these valuable inbred strains and Miss Audrey Woods is now on his staff and in charge of them. They will therefore still be available for experimental work here and elsewhere in Australia. The C48 tumour is being carried on by grafting. I still have stocks of the carcinogens, benzpyrene and methylcholanthrene, should anyone require them for experimental purposes.

(f) *Publications.*

A paper on multiple tumours occurring in a child following X-Ray treatment has been submitted for publication.

IDA MANN,
M.R.C.S., L.R.C.P., M.B., B.S., F.R.S.C.,

Appendix XI.

ABSTRACTS OF CONTRIBUTIONS TO THE LITERATURE BY AUTHORS ASSOCIATED WITH THE DEPARTMENT.

By D. J. R. Snow.

1. DAVIDSON, W. S. (1953).
The Medical Journal of Australia, i., 584-589, 5 references.
" Coronary Artery Disease in Western Australia, 1937–1950."

This is a statistical analysis by the Deputy Commissioner. It is based on death certificates, and indicates a true increase in deaths from coronary disease over the period studied. Some of the factors associated with apparent and real increases in coronary disease prevalence are discussed.

2. DAVIDSON, W. S. (1953).
The Medical Journal of Australia, ii., 248–251, 12 references.
" The Sociological Problem of Hemiplegia."

Material for this paper was obtained from a survey of the " chronic sick " in Western Australia. The requirement of " chronic beds " is 2·1 and of institutional beds 1·4 per 1,000 of the population. Hemiplegia accounts for 9·1 per cent. of the demand for chronic beds and 7·4 per cent. of the demand for institutional beds. It is suggested that special clinics and wards for hemiplegics are desirable.

3. DAVIDSON, W. S. (1953).
Leprosy Review, 24, 139–146.
" An Evaluation of New Treatments and Other Factors in Leprosy."

A study of 121 cases of leprosy at the Derby Leprosarium in North-Western Australia, treated by various methods over 1–2 years, showed that " Neustab " given in a dosage of 200 milligrammes a day gave the most promising results. It appeared to be superior to either intramuscular sulphetrone or D.A.D.P.S. However, " Neustab " was the most toxic.

4. INCZE, J. S. (1953).
The Medical Journal of Australia, i., 883–884, 4 references.
" Development of Isonicotinic Acid-Hydrazide Resistance in Mycobacterium Tuberculosis ; Preliminary Publication."

This is a contribution from the Tuberculosis Control Branch based on work with 69 cases treated with Isoniazid. Within six weeks organisms from 25 of these patients showed evidence of resistance, within 12 weeks there were 36 and within 18 weeks there were 44 examples of resistance.

5. KIRK, R. L., KIRK, M., and STENHOUSE, N. S. (1953).
British Journal of Preventive and Social Medicine, 7, 1–8, 10 references.
" Differential Fertility between Women of Blood Groups O and A."

A study by a team from the University of Western Australia made possible by the co-operation and assistance of the Director of the Public Health Laboratories, and of the King Edward Maternity Hospital, over the period 1948–51. Fertility appears to be related to blood groups.

6. SNOW, D. J. R. (1953).
The Medical Journal of Australia, i., 406–408, 4 references.
" Infective Hepatitis Among Student Nurses : an Epidemilogical Study."

Describes an outbreak of infective hepatitis among trainee nurses at the Princess Margaret Hospital for Children, in which the mode of spread appeared to be by personal contact. Four apparent " cross infections " among child patients are also recorded. It is suggested that infective hepatitis should be treated in recognised hospitals for infectious diseases.

7. SNOW, D. J. R. (1953).
The Medical Journal of Australia, i., 838–840, 4 references.
" Infective Hepatitis : An Analysis of 1,000 Consecutive Notifications in Western Australia."

A thousand consecutive notifications received by the Department during the period July, 1950–September, 1952, were analysed in regard to seasonal, age, and sex incidence. Prevalence was maximal in winter ; the 5–9 age group contributed the highest percentage of cases (26 per cent.) and 56 per cent. of all cases were under twenty years of age. The sex ratio was more or less equal. The age scatter was similar to that of a previous epidemic of poliomyelitis.

8. SNOW, D. J. R. (1953).
The Medical Journal of Australia, ii., 139–142, 3 references.
" Infective Hepatitis : A Discussion on its Mode of Spread in Families."

Consideration of the epidemiological pattern of infective hepatitis in several large Perth families suggests that close and intimate contact is necessary for infection, and that the mechanism of transmission is probably transference of particulate faeces from the affected to the susceptible.

APPENDIX XII.

REPORT OF THE EPIDEMIOLOGIST.

To the Commissioner of Public Health.

Sir,

Activities during the year under review can be divided into four categories which have gradually become defined since the inception of this appointment :—

1. The routine day-to-day control of communicable diseases other than tuberculosis, leprosy and eye conditions (for which special arrangements exist).
2. Emergencies connected with the outbreak or threatened outbreak of one or other of the epidemic diseases.
3. Special investigations designed to improve our appreciation and understanding of preventable disease with local importance.
4. Miscellaneous tasks such as those connected with the after effects of poliomyelitis.

The routine work is designed to assist in bringing about a general contraction in the prevalence of communicable disease. It involves the maintenance of specific periods of isolation and quarantine, the co-ordination of preventive measures by local authorities, the development and standardisation of immunisation policy, advice to and liaison with individual medical practitioners, and publicity on particular subjects. To a large extent this work has been tedious and repetitive but it has served to encourage the observance of a uniform system which simplifies communicable disease control.

The emergencies are of course of special interest. Their impact is felt by all sections of the Department, and they can severely tax available resources. Hitherto, such situations have been met by the hasty collection of a scratch team working under difficult conditions and heavy pressure. Much of the improvisation which has been necessary in the past could be avoided by the establishment of a small permanent unit of four or five people, each with his or her own defined responsibilities. Such a unit would improve routine administration, increase the scope of investigational projects (complementary to those of the Clinical Research Unit at the Royal Perth Hospital), and would provide a ready-made organisation for emergencies.

Special investigations are of course an indispensable feature of sound preventive medicine. Without them it is easy to fall into a rut and base administrative measures on custom rather than reason. Original investigations are, however, limited by opportunity and by facilities. The lack of a virus diagnostic unit is a handicap which has been only partially overcome by recent liaison with Adelaide, and there are still one or two gaps in our improved bacteriological facilties. Such opportunities as have arisen from time to time for general epidemiological inquiry have been pursued wherever deemed profitable.

The miscellaneous tasks undertaken have included statistical analyses of stillbirths, maternal mortality, a variety of minor obligations, and work connected with the general welfare of persons handicapped by poliomyelitis. The Poliomyelitis Almoner (Mrs. Kirkby) has done very worthy work in this field, and the Splint Shop which is financed and maintained by the Department has done well under the general management of the Princess Margaret Hospital.

A table showing the " Incidence and Mortality of Notifiable Infectious Diseases " for 1953 and the three preceding years is reproduced elsewhere.

The diseases attributable to defective hand hygiene (the dysenteries, enteric and salmonella infections) together accounted for 73 notifications as opposed to 114 in the preceding year. As every one of these cases was probably preventable. the need is apparent for encouraging hand cleanliness, with particular reference to food. If we regard hepatitis (443) and poliomyelitis (49) as intestinal infections, the need is even more impressive.

A small reduction in the prevalence of murine typhus (18 as opposed to 25 in the previous year) is also of some small comfort. It is doubtful whether rats can be eradicated altogether but constant rat suppression is imperative if the disagreeable experience of 1946–48 (with an average of over 100 cases a year) is not to be repeated.

Tetanus calls for special mention. During 1953, there were 12 cases and six deaths. Figures for each of the three preceding years have almost been identical. It is a small problem but a significant one because of the high case mortality. The obvious approach is permanent active immunisation. The dual prophylactic (combined diphtheria-tetanus toxoid) offers the best hope of protecting the entire community within the course of one generation ; and the policy is being followed of encouraging the use of this prophylactic. A special report on Tetanus Prophylactics was prepared during the year at the request of the State Health Council, approved by that body, and circulated to all medical practitioners.

Brucellosis produced its usual handful of notifications and cases will continue to occur so long as people drink raw unpasteurised or unscalded milk, or until the immunisation programme of the veterinary authorities has been fulfilled.

Diphtheria accounted for only one death during 1953, and the mortality rate for this disease of 0·16 per 100,000 represents the lowest ever recorded in the State. This is indeed a triumph for organised artificial immunisation, and it is obvious that the activity of local authorities in this field during the post-war years is now being rewarded. It is equally gratifying to note that a record number of immunisations (14,088) was carried out during the year. If this rate is maintained in the years to come, yet another controllable infectious disease will be relegated to insignificant rank in the list of public health problems.

Hepatitis continued at a high level during the year, but the epidemic which developed in 1951 and prevailed throughout 1952 showed evidence of subsiding. Special studies during this prolonged epidemic indicated the importance of hand hygiene. Three contributions arising out of these studies were submitted to and published in the Medical Journal of Australia. They apparently stimulated interest overseas, for many demands for reprints were rceeived, particularly from America.

Poliomyelitis remained at an endemic level but towards the close of the year a small but progressive increase was observed. The sense of uneasiness engendered by continued low prevalence was referred to in the previous annual report. It foreshadows a major epidemic. At the time of writing the present report (mid 1954) it is known that subsequent events justified this foreboding.

Rubella spread in epidemic form towards the latter part of the year. Over a thousand notifications were recorded. As was pointed out in the previous annual report, " this relatively trivial but highly infectious disease acquires importance only from the damage the virus can cause to unborn children in the event of pregnant women becoming infected in the early stages of pregnancy."

With the safeguard of gamma-globulin for such women who have been exposed unwittingly, it is wise policy to encourage the spread of the virus in girls' schools. The epidemic during 1954 would have served the useful purpose of immunising several hundred future mothers, and can therefore be regarded with some satisfaction.

Three major episodes during the year are worthy of extended comment. They refer to the threat of widespread typhoid fever, a small but sharp outbreak of diphtheria, and an epidemic of influenza.

1. *Typhoid and Desiccated Coconut.*

The discovery of an association between an outbreak of typhoid fever and desiccated coconut in another State was of great interest in Western Australia for several reasons :—

1. It was probably the first time that this foodstuff had been incriminated in the occurrence of typhoid fever anywhere in the world ;
2. It brought into very sharp focus the need for the utmost care in the preparation of food for public consumption ;
3. It illustrated the advantages of exchanging information with other States and the value of Federal co-ordination ;
4. It exposed certain deficiencies in our own Act and Regulations dealing with the importation of contaminated foodstuffs ;
5. It revealed the kind of reward which can repay routine painstaking epidemiological inquiry ;
6. It highlighted the need for swift and decisive action, and for public and press co-operation, in times of health emergencies ;
7. It accelerated the establishment of an Enteric Reference Laboratory in Melbourne, to which West Australian typhoid cultures can be sent for precise identification and typing—so that the pathway of infection will be more easily traceable in future.

For many years now typhoid fever has occurred only in sporadic form in Western Australia. Cases are few and far between, and the circumstances surrounding each are investigated by appropriate personnel. It is most unusual, however, for the source of infection to be detected. This is not surprising. In an individual case, the contacts are numerous. Epidemiological inquiry is tedious, confusing, and often fruitless, and comprehensive laboratory investigations are difficult to arrange. The common conclusion in the light of such information as has been gleaned is that the isolated cases to which we have become accustomed in this State are due to the accidental contamination of food by some unknown carrier. Recent improvements in laboratory and other facilities have fortunately enabled more searching investigations to be made, and two carriers have been discovered in the last few months.

Such was the position on July, 22nd, 1953, when the Federal Health Authority announced " a disturbing increase in the incidence of typhoid in a number of localities throughout the Commonwealth," but particularly in Victoria and New South Wales. Western Australia had not participated in this increase, nor, as circumstances turned out, did it do so subsequently. Up to that time only two cases had been reported in the State. The first was a woman who became ill in Kalgoorlie in March, and from whose excreta *Salmonella typhi* ('phage type E1) was recovered ; the source of infection was not discovered. The second case was a child who had been diagnosed on clinical and serological grounds at the Princess Margaret Hospital. The organism was not recovered and the source of infection could not be traced.

On 4th August, a local newspaperman sought comment on a Melbourne press report to the effect that desiccated coconut imported from Papua had been incriminated in the Victorian outbreak, and that householders had been advised to destroy their stocks by burning. A telephone call to Melbourne confirmed this report, and the following press and radio announcement was therefore released :—

> " Information received from Canberra and Melbourne gives reason to suspect that recent cases of typhoid fever could be connected with the consumption of desiccated coconut which had come from Papua. Until the position in this State has been investigated, the public are advised to refrain from consuming this foodstuff. A further announcement will be made in due course."

Meanwhile, inquiries revealed that large quantities of desiccated coconut were held by retailers and wholesalers more or less throughout the State. Some of this had come from Ceylon and was not under suspicion, but much of it had originated in Papua and was of the same brand which had been incriminated in Melbourne.

It was obviously imperative that these stocks be " frozen " until appropriate tests could be completed. After studying the Health Act, however, there was considerable doubt whether the sale of coconut could be forbidden under existing laws. Nevertheless, through the co-operation of those concerned, a preliminary series of 18 random samples were collected ; Ceylonese and Papuan varieties were equally represented. Ceylon coconut was negative, but four of the Papuan samples contained bacteria of faecal origin (*Salmonella senftenberg*). Excretal contamination was therefore indicated although typhoid organisms were not found, and further sampling was arranged.

Under Section 251 of the Health Act, which provides special powers " for the purpose of more effectually checking or preventing the spread of any dangerous infectious disease," an order was issued directing that all persons " who have in their possession desiccated coconut produced in Papua shall forthwith isolate the desiccated coconut and take such action as may be necessary to prevent it being used as food for man or beast, and to prevent it from coming into contact with any food or drug ". The word " beast " was included to prevent the coconut being fed to animals and poultry, which might become infected and thus constitute a potential reservoir of salmonella organisms in the future.

Fortunately, at this juncture, an inter-State meeting on poliomyelitis was about to take place in Sydney and, at Western Australia's request, the Commonwealth arranged an opportunity at the conclusion of the meeting for a full exchange of information between departmental representatives on the typhoid position. It transpired that New South Wales, Victoria, and Queensland had all been seriously affected, but that Victoria was the only State with impressive evidence involving coconut. In an endeavour to identify some common bulk food which had been eaten by all typhoid cases, two independent observers had detected desiccated coconut. Thus, of seven people who sat down to a meal, only three ate " lamingtons " dusted with desiccated coconut ; in due course only these three developed typhoid. A wholesaler supplied one carton of " Tropic Snow " to a grocer ; seven cases of typhoid quickly developed among this grocer's customers. The stools of contacts of early cases of typhoid revealed a variety of salmonella organisms including unusual ones like *s. senftenberg* and *s. potsdam*, which were also found in "Tropic Snow". A Health Inspector found that the only articles consumed by *all* of a series of cases of typhoid were " snowballs " with desiccated coconut. All this early evidence was essentially circumstantial, but it clearly warranted a prompt embargo on coconut until full bacteriological and other investigations could be conducted. Meanwhile, the conditions under which desiccated coconut was being prepared in Papua was made the subject of a thorough investigation by the appropriate authorities.

The second series of samples were taken from 48 previously unopened cartons of " Tropic Snow " brand desiccated coconut from Papua, but only one proved positive (*salmonella nyborg*). Meanwhile, information was received to the effect that a variety of salmonella organisms (including *s. senftenberg, typhimurim,* and *potsdam*) had been found in coconut in the Eastern States, and that *salmonella typhi* itself had been recovered from a sample taken from an opened package in a Canberra retail establishment. The search for typhoid organisms was therefore pursued, and although 16 of a further 52 samples disclosed *s. senftenberg*, no typhoid organisms were found. Finally, information from the Eastern States suggested that cartons bearing the stencil mark " C3X " were specially suspect, and out of 690 cartons in Perth at that time, 28 bore these markings. All 28 were therefore sampled and nine were found to contain *s. senftenberg.*

Thus, out of a total of 137 samples examined, 30 (about 22 per cent.), contained faecal organisms indicative of excremental contamination, but the causative organism of typhoid was never found. The absence of cases of typhoid fever in Perth was consistent with these findings, but the problem remained of disposing of large quantities of desiccated coconut known to be infected with organisms capable of producing gastro-enteritis.

On August 21st, with the special authority of the Governor in Council, the Commissioner ordered all persons with Papuan coconut in their possession to deliver these stocks to the respective Local Health Authorities within a specified period of time. Further, the Commissioner was empowered by the Governor in Executive Council, under Section 251, sub-section (18) of the Health Act, " to destroy or order the destruction of all such desiccated coconut which is within the State, whether existing in free form or mixed with anything, and anything reasonably suspected of being or containing desiccated coconut produced in Papua ; and also desiccated coconut produced or reasonably suspected of having been produced in Papua which may arrive in the State within the next six months."

The vexed question of compensation had, of course, actively exercised the minds of those concerned. In accordance with Section 259 of the Western Australian Health Act " In every case where . . . . anything is destroyed by direction of the Commissioner or the local authority, the owner shall be entitled to compensation to the extent and subject to the conditions . . . . the compensation shall not exceed the actual market value of the . . . . thing destroyed." It seemed unreasonable that the Government should virtually have to buy and destroy polluted food brought into the State by private importers. On the other hand, it seemed unfair that these importers should be unduly penalised for the importation of food which they believed to be wholesome at the time of importation. The problem was therefore referred to the Crown Law Department for advice, and the Solicitor-General advised that if the coconut were destroyed under orders from the Commissioner, then compensation would be payable under Section 259. It is significant that the regulations in the various States vary widely, but that compensation was apparently not payable in any of the other States.

The problem was further aggravated by the impending arrival of a large consignment of Papuan coconut, the import of which had been arranged long before its possible association with typhoid had even been suspected. Under existing law there was nothing to prevent this and subsequent shipments from being unloaded in this State. A special Act of Parliament (The Diseased Coconut Act, 1953), however, was soon passed " to prohibit the importation into this State of certain desiccated coconut, to empower the Commissioner of Public Health to destroy certain desiccated coconut without payment of compensation and for other purposes ".

Considerable thought was given to the possibility of treating the coconut in order to render it safe for human consumption and both the Government Analyst and the Bacteriologist undertook several experiments. Moist heat was unsuitable, dry heat exceeding the thermal death point of typhoid organisms caused charring. Chemicals were said to be unreliable. Handling and plant present problems. Finally, all proposals in this connection had to be rejected. Meanwhile, it was learned that certain industrial establishments in the Eastern States were equipped to extract the oil under very high temperatures and pressures, and to convert the residue into meal for stock food. The temperatures and times involved were adequate to destroy all pathogens in the process. Rather than destroy all stocks of coconut by incineration or other means, it was eventually decided to negotiate for the disposal of accumulated stocks in this way and so minimise the loss arising out of the compensation disbursed.

Eventual accounting disclosed that approximately 58,000 lb. of desiccated coconut had been seized ; over £7,000 had been paid out by way of compensation, and the financial return from the coconut shipped back to the East for commercial processing was estimated at about £2,000. This unprecedented experience in the field of Public Health therefore cost the State at least £5,000. The saving in sickness and lives will never be known, but there can be little doubt that the measures taken were amply justified.

II. DIPHTHERIA—A SMALL OUTBREAK IN AN ISOLATED SETTLEMENT.

The permanent population of Esperance is upwards of one thousand persons, but this number is trebled during the few hot months, owing to an influx of holdiay-makers from the Goldfields and elsewhere. A doctor had practised there for several years but died recently after a chronic disabling illness. As a result, the town had been left for some time with inadequate medical services, and a number of children had missed routine immunisation against diphtheria. It was estimated that out of approximately 180 children in and around the settlement about 30 had not been protected. Further, the disease had not been seen in the area for over two years.

It was in these circumstances that an outbreak developed towards the end of November and involved mainly the unimmunised children. In all, there were 17 cases (including one death) and two carriers. The five previously inoculated children who yielded positive swabs were either temporary carriers or suffered only a mild attack of the disease ; and all survived.

It was not possible to determine how the infection was introduced into the Esperance community, but the earliest cases occurred in an unimmunised family living some miles away from the town. Of the five children in this family, one (a girl aged five years) developed laryngeal diphtheria and died despite tracheotomy ; two others suffered from the faucial type of the disease, and a fourth was found to be a carrier. Within a matter of a few days seven further cases occurred and two carriers were detected. A week later two more cases occurred and then there was a lull of about a fortnight when four cases occurred in a single family.

The first information regarding the outbreak was received on 30th November, when the Norseman doctor who had been visiting Esperance fortnightly, telephoned to ask whether some emergency arrangement could be made to provide temporary medical facilities at Esperance because of several cases of diphtheria. Later that day the Matron of the Esperance Hospital asked for urgent supplies of antitoxin and reported more fresh cases.

Through the co-operation of the Medical Superintendent, Royal Perth Hospital, a doctor with some previous experience of infectious diseases was made available for one week, and a 'plane was chartered to fly him, together with emergency supplies of antitoxin and diphtheria prophylactic to Esperance.

As a result, there was little or no delay in the administration of antitoxin to children suffering from the disease, and the injection of a first dose of prophylactic to those children who had missed routine immunisation. All close contacts were swabbed and cultures performed either at the Commonwealth Laboratory in Kalgoorlie or the Public Health Laboratory in Perth.

Had it not been for these prompt measures it is likely that more cases would have occurred. As it was, the doctor reported the situation under control within a short time of his arrival and indicated that all measures that were necessary had been taken.

The principles applied in the control of the outbreak were :—

1. Isolation and treatment of cases ;
2. Swabbing of close contacts and segregation until swab results were known ;
3. The injection of all unimmunised children with a first dose of diphtheria toxoid, and the administration of refresher doses to children who had been immunised more than four years previously.

It is the practice of some authorities elsewhere to administer a minimal dose of antitoxin to unimmunised children who have been exposed to infection, on the grounds that immediate though short-lived immunity can be conferred. The disadvantages of this procedure are, firstly, that the risk of subsequent serum sickness is enhanced and, secondly, that it interferes with the development of active long-lasting immunity. Finally, the mass use of prophylactic antitoxin does not seem to be necessary. For several years now we have refrained from this practice and, instead, have given a first dose of toxoid to provoke active immunity. This takes some time to develop and may not therefore be of immediate benefit but has the merit of relative permanency.

We have followed these principles in several small outbreaks or threatened outbreaks in institutions in Perth during the last few years and have found them quite successful.

The outbreak at Esperance emphasises the importance of maintaining the maximum level of artificial immunisation especially in isolated communities ; and illustrates the administrative difficulties of dealing with outbreaks of infectious disease in remote settlements.

III. INFLUENZA " B " : The Outbreak during August and September.

1. *Background.*

Influenza is not a notifiable disease in Western Australia, but towards the end of August it became apparent that a condition resembling influenza was unduly prevalent in Perth, and on 4th September it was first mentioned in the press. It was difficult to say whether this represented the usual late winter increase in miscellaneous upper respiratory tract infections or whether it was in fact an outbreak of some specific disease. Early in September, information was received that three deaths in young people had taken place at the Royal Perth Hospital and Princess Margaret Hospital and that these were thought to be due to staphylococcal pneumonia following influenza.

On 11th September, therefore, questionnaires were sent to 81 doctors holding appointments as Medical Officers of Health with various local authorities throughout the State. The questionnaires asked for information concerning prevalence, severity, fatalities, clinical features, complications, age and sex distribution, and treatment. At the same time a return was asked for from various State Departments showing the number of " influenza absentees " week by week ; and all the larger hospitals were asked to submit a statement of influenza admissions and absenteeism among staffs.

Of the 81 Medical Officers of Health, 64 returned completed questionnaires, and from these replies the following data has been abstracted.

2. *Incidence and Deaths.*

Some 4,000 cases of a respiratory condition indistinguishable from epidemic influenza had been seen by 64 doctors. There had been at least 11 deaths ; three of these took place in metropolitan hospitals and all were " teenagers " ; eight occurred in the country and included both infants and very old people. All these fatal cases appear to have been associated with pneumonia.

3. *Absenteeism.*

Returns from metropolitan and major country hospitals indicated that up to 10 per cent. of the staff had been affected between the middle of August and the middle of September ; although a relatively small proportion of total admissions to hospital were due to influenza. Statements from twelve Government Departments showed an absentee rate of about 10 per cent. over the period mentioned, with an average duration of absence of 4 days per illness.

4. *Age and Sex Selection.*

Reports on the age incidence of cases differed somewhat, but the majority indicated that although all ages had been attacked, the main onslaught was in the 15–45 age span. The youngest cases were a few months old and the oldest in the eighties.

There was no difference in sex selection.

5. *Geographical Distribution.*

It was not possible to say with certainty where undue incidence was first noticed but the condition was certainly wide-spread throughout the State. Three notable exceptions where no cases were reported were Wyndham in the north, Esperance in the south, and Mandurah, a seaside resort about 50 miles from Perth.

6. *Clinical Features.*

Clinical manifestations, according to the reports, were not peculiar. They were consistent with those of known outbreaks of influenza described in other parts of the world. The following represents the " consolidated " clinical picture.

The commonest mode of presentation described was the sudden onset of headache, backache, pains in the limbs, chilliness, coryza, sore throat, and an unproductive cough. The headache was in some instances specified as frontal, while the limb pains were referred to as muscle pains and joint pains. Pain in the chest was recorded in others. In a few cases the sense of chilliness amounted to rigors. Only in a minority did the sore throat proceed to hoarseness and retro-sternal discomfort. There were frequent references to nausea and epigastric discomfort occasionally accompanied by vomiting. Diarrhoea was rare. Pyrexia was of the order of 100°–102° F., but in several examples reached 104° and even 105° ; a secondary rise giving a " saddle-back " curve or an apyrexial interval followed by a relapse was seen in a minority. The cough appeared to have been of a dry irritating type, frequently paroxysmal, and usually worse at night. Mention was made of a relative bradycardia. Epistaxis was observed in children.

The clinical pattern was, however, extremely variable.

The average duration of the illness was about four or five days, but post-febrile depression was specially noted and in several instances lasted longer than the acute stage of the illness itself.

7. *Severity and Complications.*

Some 10–15 per cent. of all cases were classified as severe. The complications most frequently mentioned were myringitis and otitis media, with pneumonia the next most common, and an occasional reference to sinusitis. It was difficult to indicate the precise proportion of " complicated cases " but it appeared that something between 5 per cent. and 10 per cent. of cases were associated with some complication.

8. *Treatment.*

The vast majority were treated symptomatically while the severe and complicated cases received sulphonamides, penicillin, chloramphenicol, aureomycin or terramycin according to the personal preference of the practitioner concerned. There was no conspicuous indication that any one remedy was more effective than another.

9. *Laboratory Investigations.*

Throat washings from suspected cases, together with tracheal material from the fatal cases, were sent by the Clinical Research Unit at the Royal Perth Hospital to the Walter and Eliza Hall Institute of Medical Research. Specimens of blood from several Perth and Fremantle hospital patients were sent by the Public Health Laboratories to the Commonwealth Serum Laboratories for serological typing, and the subsequent findings indicated that the nature of the Perth epidemic was Influenza type " B " which was " identical with the Melbourne epidemic."

During the latter half of September cases became progressively fewer, and by the end of the first week in October the epidemic had terminated.

10. *Summary.*

An explosive outbreak of influenza (Type B) involving some 4,000 cases, mainly within the 15–45 age span, occurred during August and September, 1953. The clinical features were characteristic but, on the whole, the disease was of a mild form. Between five to ten per cent. were associated with a complication such as middle ear infection or pneumonia, and the fatality rate was about 0·2 per cent.

It is interesting to note that the 1919 epidemic also occurred mainly during the months of August and September, involving over 5,000 cases with a mortality of over nine per cent.

APPENDIX XIII.

THE HISTORY OF SOME COMMUNICABLE DISEASES IN WESTERN AUSTRALIA (1828-1951), PART III.

By Dr. D. J. R. Snow.

The first part of this feature dealt with *smallpox* and *plague* (Annual Report for 1951) ; the second part concerned *diptheria, scarlet fever, whooping cough,* and *measles.* (Annual Report for 1952). The present instalment includes available data on *influenza, typhoid fever,* and *murine typhus.*

VII. INFLUENZA (1828–1951).

The history of influenza in Australia has been recorded by Cumpston in one of his classical monographs (1919), but references to Western Australia are scanty and infrequent. A search through early local records has likewise been disappointing. There is, however, no reason to suppose that the Swan River Colony escaped during the epedemic that overtook Australia prior to the two great pandemics of 1891 and 1919. Mortality statistics of the State's experience are available since 1887, and the accompanying graph reveals three conspicuous peaks in the years 1891, 1899, and 1919.

The 1919 epidemic is the only one which is well recorded (Atkinson, 1920). It involved 5,559 cases and 538 deaths ; began in June, reached a maximum in August (with a second peak in September), and subsided suddenly early in October. All ages were effected and there was not a very marked difference in incidence in the various age groups. Incidence in the 5-9 age group was, however, somewhat higher (659 cases) than in any other comparable group, although the mortality was lowest (0·76 per cent.). The disease appears to have been particularly severe in the young adults, and the case fatality rate between the ages of 20 and 40 years was approximately 13 per cent., while the overall mortality was 9·7 per cent. It appears that the infection was introduced from the Eastern States, probably Victoria, despite elaborate quarantine arrangements on the Goldfields section of the Trans-Australian Railway.

This epidemic raised enormous administrative problems, the like of which were probably never encountered before and certainly have not been experienced since. Because of its short incubation period and high attack rate, the disease, in severe pandemic form, quickly swamps available facilities. It is therefore one of the most alarming phenomena in the field of epidemiology and is always regarded with the greatest concern by the Public Health Authority. It is likely that the disease will continue to be a major preoccupation within the sphere of preventative medicine for many years to come.

References.

ATKINSON, R. C. Everitt (1920). Report of the Commissioner of Public Health, Western Australia, for the two years ending 31st December, 1919.

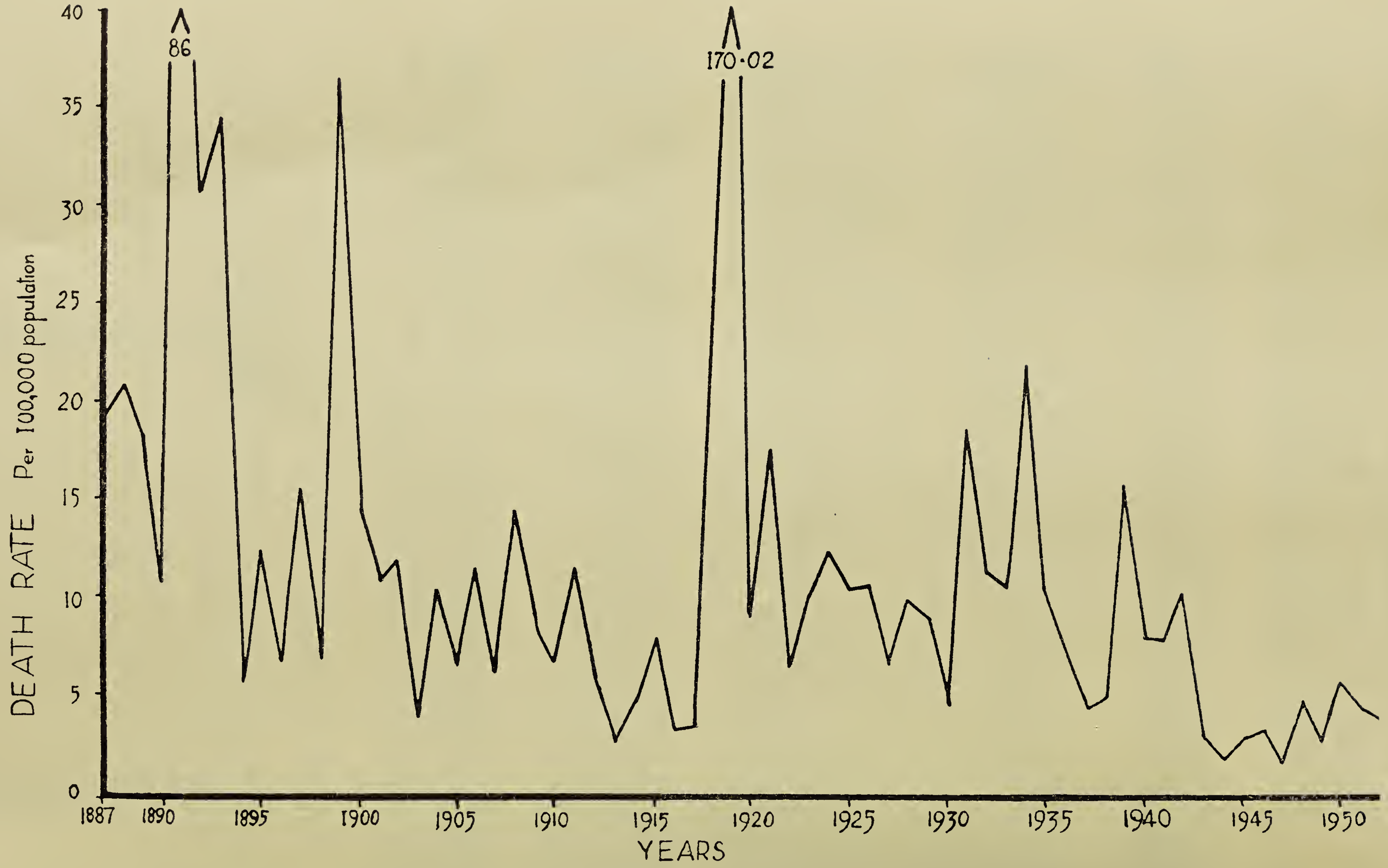
CUMPSTON, J. H. L. (1919). " Influenza and Maritime Quarantine in Australia," Quarantine Service Publication No. 18, Commonwealth of Australia.

INFLUENZA MORTALITY : WESTERN AUSTRALIA, 1887–1952.

Year.	Mortality Rate per 100,000 Mean Population.
1887	19·1
1888	20·9
1889	18·1
1890	10·6
1891	86·0
1892	30·9
1893	34·4
1894	5·4
1895	12·1
1896	6·7

(Actual numbers of deaths not available).

Source : Cumpston, J. H. L. (1919). " Influenza and Maritime Quarantine in Australia," Quarantine Service Publication No. 18, Commonwealth of Australia.



INFLUENZA MORTALITY · WESTERN AUSTRALIA · 1887 – 1952

Period.	Deaths.	Mean Population.	Rate per 100,000
1897	23	148,656	15·47
1898	11	163,687	6·72
1899	61	168,568	36·19
1900	25	175,113	14·28
1897–1900	120	656,024	18·29
1901	20	188,135	10·63
1902	24	204,705	11·72
1903	8	219,643	3·64
1904	24	233,963	10·26
1905	16	246,681	6·49
1901–1905	92	1,093,127	8·42
1906	29	254,362	11·40
1907	16	255,510	6·26
1908	37	257,822	14·35
1909	24	263,279	9·12
1910	18	271,019	6·64
1906–1910	124	1,301,992	9·52
1911	32	286,712	11·16
1912	18	301,040	5·98
1913	8	313,383	2·55
1914	16	322,668	4·96
1915	25	321,247	7·78
1911–1915	99	1,545,050	6·41
1916	10	313,066	3·19
1917	10	306,339	3·26
1918	69	308,198	22·39
1919	544	319,955	170·02
1920	30	330,023	9·09
1916–1920	663	1,577,581	42·03
1921	58	334,084	17·36
1922	22	341,375	6·44
1923	35	350,772	9·98
1924	44	363,152	12·12
1925	38	372,970	10·19
1921–1925	197	1,762,353	11·18
1926	40	380,930	10·50
1927	25	392,071	6·38
1928	40	407,576	9·81
1929	37	420,756	8·79
1930	20	429,079	4·66
1926–1930	162	2,030,412	7·98
1931	80	432,347	18·50
1932	48	435,041	11·03
1933	46	438,780	10·48
1934	96	442,354	21·70
1935	45	446,874	10·07
1931–1935	315	2,195,396	14·35
1936	33	452,294	7·30
1937	20	457,328	4·37
1938	23	463,808	4·96
1939	74	469,780	15·75
1940	37	473,397	7·82
1936–1940	187	2,316,607	8·07
1941	37	473,988	7·81
1942	48	476,619	10·07
1943	14	476,745	2·94
1944	9	481,498	1·87
1945	14	487,510	2·87
1941–1945	122	2,396,360	5·09
1946	15	492,771	3·04
1947	8	502,978	1·59
1948	23	514,843	4·47
1949	13	533,083	2·44
1950	32	558,709	5·73
1946–1950	91	2,602,384	3·50
1951	24	581,459	4·13
1952	23	602,026	3·82

Sources : Deaths—Statistical Register of W.A., Annual Reports of the Commissioner of Public Health.

Population—Demography, Monthly Report of Government Statistician, W.A.

Notes : (1) From 1922 to 1949 deaths include " Influenza—with specified pneumonic complications " and " Influenza—other."

(2) From 1950 onwards deaths include causes 480 to 483 of 6th (1948) Revision of International List of Causes of Death.

(Data assembled by Mr. J. F. Woolcott.)

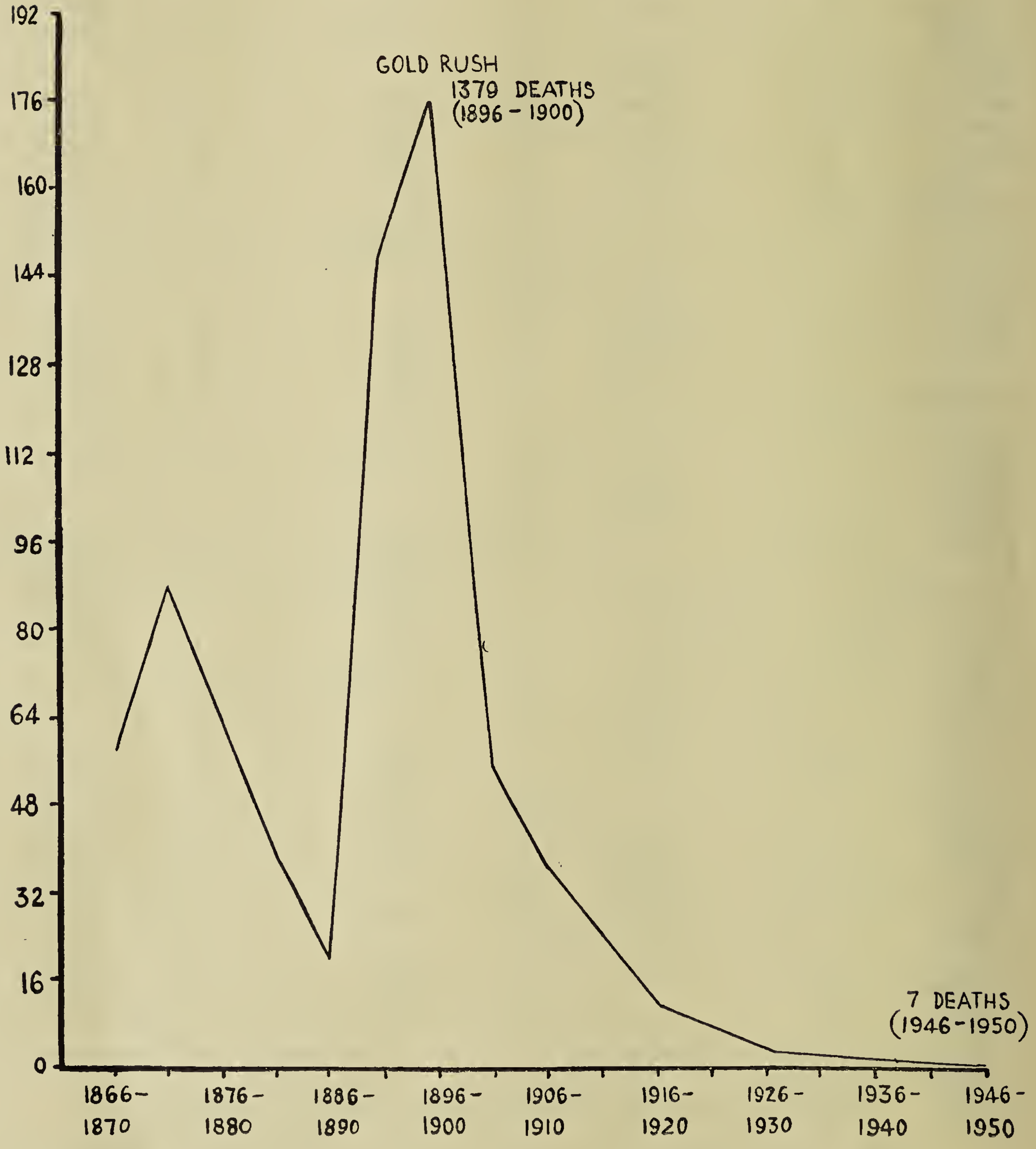
VIII. TYPHOID FEVER (1828–1951).

Information concerning the prevalence of typhoid fever in Western Australia during its early settlement is very scanty. A report by Milligan in 1831 includes a description of a few cases of continued fever, the clinical features of which are consistent with typhoid fever, but there is little subsequent reference to this type of disease until the Annual Report of Harris for the year 1844, in which he records six cases of continued fever resembling typhus. Registration of deaths was introduced in 1841 and thereafter the causes of death were more precisely recorded. From 1845 to 1849 however, this disease killed few people. In 1852 an

TYPHOID FEVER

MORTALITY RATE PER 100,000 MEAN POPULATION
IN QUINQUENNIAL PERIODS : 1866 - 1950

WESTERN AUSTRALIA



outbreak of 138 cases occurred during three months (March, April and May) in the Fremantle Council Settlement. The Medical Board which investigated this outbreak describes " a continued fever of a low typhoid type." Owing to an alteration in terminology however, it is difficult to identify cases registered during the period 1850–59 although a number of cases of typhoid were probably included under the terms " fever," " disentery and diarrhoea," and so on. Similar difficulties apply to the period 1860–70 and even 1870-80, when a number of cases of typhoid were included under the term " bowel complaints," and it was not until 1886 that " typhoid fever " was introduced as a specific term in death registration, whereafter it figured prominently as a cause of death particularly in the 20-30 age group.

Detailed records of typhoid deaths by age and sex in Western Australia have been available since 1897 and reference to the accompanying graph of the mortality rates in quinquennial periods from 1866 to 1950 shows that at the close of the last century typhoid fever was of major public health concern, but that mortality from this disease has since declined so swiftly that it is now no longer a problem. A substantial contribution to typhoid mortality was made by insanitary conditions which prevailed during the gold rushes of the nineties.

There can be no doubt that the virtual abolition of this disease is attributable to improvements in the disposal of excreta, to the provision of pure water supplies, and to the protection of food. In short, the disappearance of typhoid fever is an impressive demonstration of the success of public health measures.

The accompanying table which has very kindly been prepared for me by Mr. J. F. Woolcott sets out all the available data relating to mortality from typhoid fever in Western Australia for the last 87 years (1864-1950).

Between 1890 and 1900 the population of W.A quadrupled to nearly 180,000 mainly because of the discovery of gold in various localities ; and it is not surprising to see that the death rate for typhoid fever sky-rocketed to levels never before or since recorded in this State. In 1895 the specific death rate due to typhoid exceeded 3·5 per 1,000 and the morbidity from this disease at the time was about 25 per 1,000, or 2·5 per cent.

During the period 1904–1923 (20 years) about 10,000 cases were notified and 1,225 of these died—giving a case mortality of approximately 12 per cent.

The next twenty-year period (1924–1943) contributed only 186 deaths despite a greatly increased population, and since then there have been very few deaths from this disease, the specific death rate having remained consistently below unity.

WESTERN AUSTRALIA—MORTALITY FROM TYPHOID FEVER, 1864–1951.

Year.	Mean Population.	No. of Deaths.	Rate per 100,000.*
1864	19,888	12	61·6 *
1865	20,872	12	59·2
1864–65	40,760	24	58·8
1866	21,876	14	66·4
1867	22,759	16	73·6
1868	23,720	23	101·1
1869	24,473	5	21·8
1870	24,894	11	43·8
1866–70	117,722	69	58·6
1871	25,291	5	19·7
1872	25,652	10	38·8
1873	25,904	10	38·8
1874	26,204	36	137·3
1875	26,729	49	183·4
1871–75	129,780	110	84·8
1876	27,338	11	40·2
1877	27,958	11	39·5
1878	28,427	23	81·6
1879	28,876	21	73·2
1880	29,350	23	79·2
1876–80	141,949	89	62·7
1881	29,859	12	39·9
1882	30,586	8	26·0
1883	31,551	10	31·5
1884	32,816	10	30·3
1885	34,753	22	62·5
1881–85	159,565	62	38·8
1886	38,282	13	32·9
1887	42,212	13	30·8
1888	43,817	7	16·0
1889	44,737	7	15·6
1890	47,081	2	4·2
1886–90	216,129	42	19·4
1891	50,840	12	23·6
1892	55,873	55	98·4
1893	61,746	28	45·3
1894	73,251	73	99·6
1895	91,047	325	357·0
1891–95	332,757	493	148·2
1896	118,666	400	337·0
1897	148,656	407	273·0
1898	163,687	296	181·0
1899	168,568	148	88·0
1900	175,113	128	74·0
1896–1900	774,690	1,379	178·0
1901	188,135	120	64·0
1902	204,705	181	88·0
1903	219,643	132	60·0
1904	233,963	87	37·0
1905	246,681	107	43·0
1901–1905	1,093,127	627	57·3
1906	254,362	128	50·0
1907	255,510	123	48·0
1908	257,822	75	29·0
1909	263,279	83	32·0
1910	271,019	50	18·0
1906–1910	1,301,992	459	35·2
1911	286,712	84	29·29
1912	301,040	100	33·21
1913	313,383	63	20·10
1914	322,668	57	17·66
1915	321,247	46	14·31
1911–15	1,545,050	350	22·6

* Refer Notes, 60·3, 57·5.

Year.	Mean Population.	No. of Deaths.	Rate per 100,000.
1916	313,066	39	12·45
1917	306,339	29	9·43
1918	308,198	21	6·83
1919	319,955	18	5·62
1920	330,023	29	8·78
1916–20	1,577,581	136	8·62
1921	334,084	43	12·87
1922	341,375	25	7·32
1923	350,772	18	5·13
1924	363,152	22	6·05
1925	372,970	14	3·75
1921–25	1,762,353	122	6·92
1926	380,930	15	3·93
1927	392,071	10	2·55
1928	407,576	12	2·94
1929	420,756	10	2·37
1930	429,079	19	4·42
1926–30	2,030,412	66	3·25
1931	432,347	8	1·85
1932	435,041	3	0·69
1933	438,780	8	1·82
1934	442,354	16	3·61
1935	446,874	6	1·34
1931–35	2,195,396	41	1·86
1936	452,294	11	2·43
1937	457,328	8	1·75
1938	463,808	5	1·07
1939	469,780	6	1·27
1940	473,397	3	0·63
1936–40	2,316,607	33	1·42
1941	473,988	1	0·21
1942	476,619	6	1·25
1943	476,745	3	0·62
1944	481,498	1	0·20
1945	487,510	....	....
1941–45	2,396,370	11	0·45
1946	492,771	3	0·60
1947	502,978	2	0·39
1948	514,843	1	0·19
1949	533,083	....	....
1950	558,709	1	0·18
1946–50	2,602,384	7	0·27
1951	581,462	....	....

SOURCES.

Deaths, 1864–1923.—Cumpston, J. H. L. & McCallum, F. (1927) " The History of the Intestinal Infections (and Typhus Fever) in Australia, 1788–1923," Service Publication No. 36, Department of Health, Commonwealth of Australia.

Deaths, 1924–1950.—Statistical Registers of Western Australia.

Mean Calendar Populations, 1864–1949.—Demography, 1949.

Mean Calendar Population, 1950.—Calculated as per standard formula from figures obtained from Monthly Bulletin of Government Statistician, Western Australia.

Mortality Rates, 1864–1910.—Cumpston, J. H. L., etc. (as above), Rates for individual years may not agree with populations and number of deaths as listed ; it is not stated what population figures Cumpston and McCallum used.

IX. TYPHUS FEVER (Murine Type) : 1828–1952.

No reliable data is available concerning typhus fever in Western Australia prior to 1927. Typhus was not even specified as a cause of death in the classification used before that year. The disease has been notifiable since 1911, but the earliest useful records date from 1927. In that year " Brill's or Endemic Typhus " was specifically declared notifiable ; and, finally, in 1932, an amendment to the Health Act included " typhus fever (all forms) " among the other infectious diseases requiring notification.

So far as is known, the only form of typhus fever which has occurred in the State is that form which is due to *Rickettsia mooseri*, and which is believed to be conveyed from rats to man through the agency of the rat flea, notably *xenopsylla cheopis*. It is currently known as " *murine typhus* " indicating its association with rodents. Brill's disease is said " never to have been found in Western Australia," but the term has been loosely applied within the State to cases of murine typhus. In any event, probably all the notifications and deaths here recorded relate to the murine form of the disease.

In view of the early Adelaide reports of a disease " closely resembling typhus fever " (Hone, 1922 and 1923), which had been observed as far back as 1918, it is quite likely that murine typhus prevailed in Western Australia for many years prior to the earliest official records of the disease in 1927.

Although the disease appears to have kept within endemic limits until shortly after the end of the late war, official documents disclose the occurrence of at least one well-defined outbreak.

In June, 1944, Dr. D. J. Oldmeadow, then Government Medical Officer at Broome, reported seeing 20 cases among natives at the Beagle Bay Mission. There were three deaths (one woman and two infants). The disease was characterised by severe headache, continuous fever of up to 12 days' duration, and extreme post-febrile debility. The locality was apparently overrun by rats and no less than 200 were destroyed in a short time. These cases are said to have been confirmed serologically.

During the first six months of 1944 there was an unduly high incidence in Perth and Fremantle, some 66 cases being recorded in the time. Adults were mainly involved, and they represented a wide variety of occupations including labourers, fitters, mechanics, packers, pensioners, hairdressers, chemists, gardeners, builders, and housewives. In many instances the home or place of work was found to be infested either with fleas or with rats.

Special Investigation (1948–1950).

In 1947 the incidence of murine typhus in the State reached a level higher than any previously recorded. No less than 142 cases were reported although only three deaths were attributed to the disease.

Dr. Cecil Cook, the then Commissioner, accordingly took vigorous steps to combat rat and flea infestation, and at the same time succeeded in organising a research project covering the more important aspects of the infection.

With the aid of a grant from the National Health and Medical Research Council, arrangements were made for Dr. A. N. Kingsbury (of " OXK " fame) to undertake serological studies, and Dr. E. P. Hodgkin to make appropriate entomological investigations. On Dr. Kingsbury's retirement a few months later his part of the project was taken over by Dr. W. A. Young.

The primary objects of the investigation were to :

(1) prove that a typhus-like fever in W.A. was of Rickettsial origin ;

(2) that rats, or other rodents, were the animal reservoir of this infection, and

(3) that rat fleas or other insects were the natural transmitting agent of the infection from rodent to man.

The following information has been abstracted from a *report by Dr. E. P. Hodgkin :—*

From August, 1948, to January, 1950 (inclusive), flea counts were done on 318 rats (290 *rattus rattus* and 28 *rattus norvegicus*) and 431 fleas were identified (167 *xenopsylla cheopis* and 264 *leptosylla segnis*). In addition, small numbers of fleas belonging to the following genera were recovered—*Ctenocephalides Nosophyllus,* and *Echidnophaga.*

The average number of fleas recovered per rat was less than two, which " was very low by comparison with experience elsewhere " ; and the number of rats available for regular examination was too small to give a fair indication of any seasonal periodicity in the rat flea population.

Specimens of heart blood from a number of rats (almost all from the Perth and Fremantle areas) were sent to Professor Burnet's laboratories in Melbourne for serological examination. Of 20 specimens examined nine showed either definite or probable evidence of infection.

Subsequently, in February, 1950, tests for complement-fixing-antibody were arranged on blood taken from 19 rats in various country centres. Of these, seven were positive and 12 negative. The infected rats were found at Bunbury, Collie and Albany.

In his commentary on the findings, *Professor Burnet* stated : " The position therefore seems clear that something of the order 25–50 per cent. of rats in the Perth area are infected or have been infected with typhus. The situation therefore is similar to most of the endemic areas of southern U.S.A. . . . . . These positive results obtained with the Queensland strain of murine typhus seem also sufficient to establish that the local strains are serologically similar to the Queensland one and by implication to murine strains generally throughout the world . . . ."

The following remarks are based on the *report by Dr. W. A. Young* on that aspect of the laboratory investigation undertaken by him :

" The principal role assigned to my laboratory was the transmission of the infective agent from man to guinea-pigs and mice, the establishment of infective strains of the organism in these animals and the forwarding of infected animals by air to Professor Burnet . . . ."

Repeated attempts to infect guinea-pigs by intra-peritoneal injection with 2 c.c. of sieved blood clot from patients, were unsuccessful. Unfortunately, in most cases, the inoculations were carried out with blood taken from the 7th to the 10th day of fever, and Dr. Young points out that " Rickettsiae are only present in the blood in the first few days of the fever."

As none of the inoculated animals developed the requisite febrile reaction (a temperature of 104° F. persisting for 48 hours), six were sacrificed on the 10th to 12th days but no satisfactory evidence of Rickettsial infection could be demonstrated.

In view of the failure to transmit the infection from man to guinea-pig by the inoculation of blood, an attempt was made to recover the infective agent from dust in rat runs. Fifteen samples of dust suspended in saline were inoculated intraperitoneally without any illness developing in the guinea-pigs.

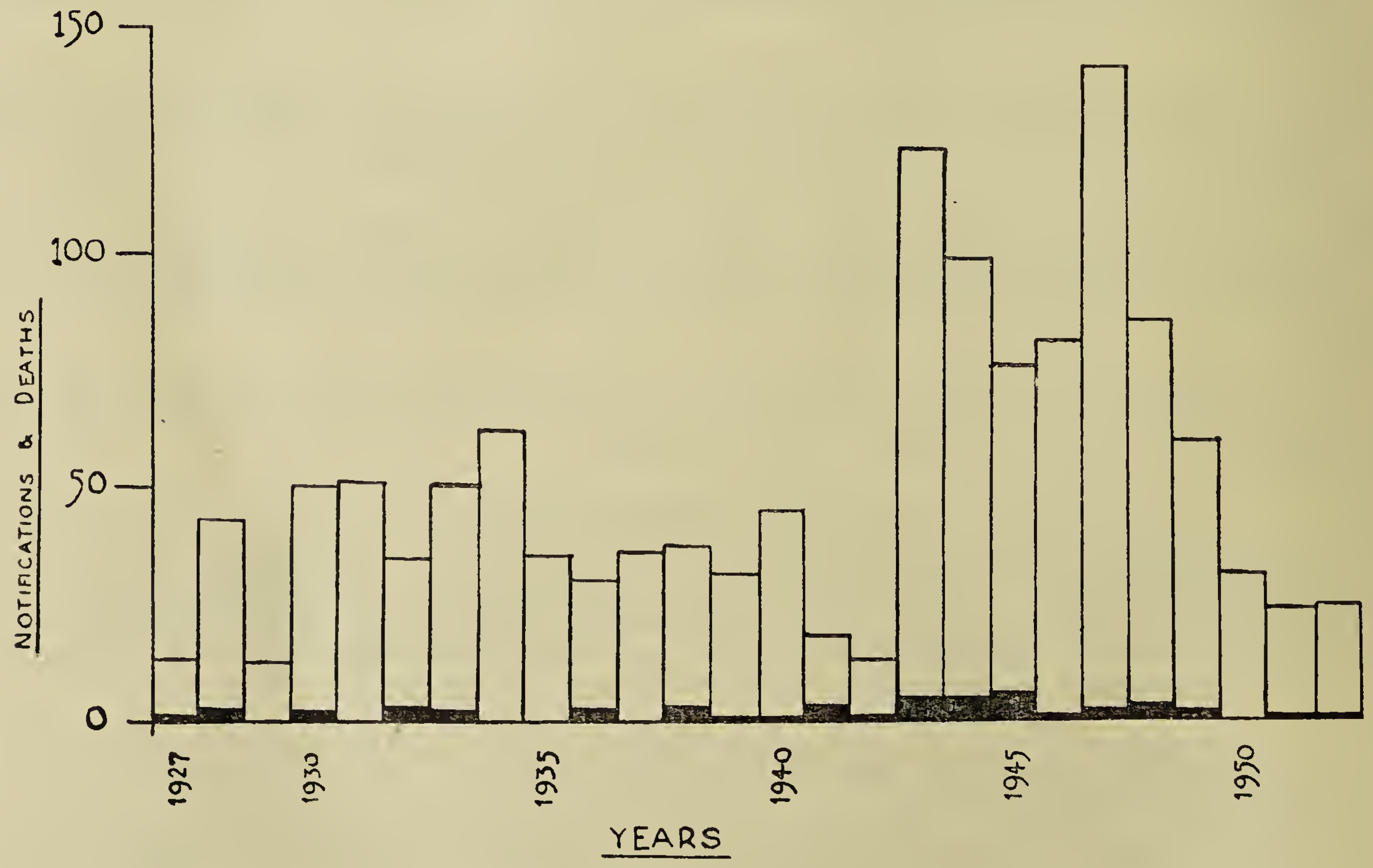
The results of the investigation were therefore extremely disappointing. The infective agent was not recovered nor was it transmitted to laboratory animals. All that emerged was that there was serological evidence of typhus infection in a proportion of rats both in the metropolitan area and in certain country centres. Nevertheless, this, together with Sir Macfarlane Burnet's commentary, indicates that the typhus-like disease which is endemic in the State is probably identical epidemiologically and in other respects with the murine typhus of other parts of the world.

The complete annual record of notifications and deaths registered since 1927 is reproduced in the following tables. Unfortunately, incidence by months is not available for the war years 1939–1943, when there was some disorganisation in routine record-keeping. During the period 1927–1938 and 1944–1952 however, over 1,000 cases have been noted. Over half of these cover the four months March to June, or late summer and autumn, a preponderance which is consistent with the bionomics of the rat-flea.

The geographical distribution of the 376 cases which were notified during the six years, 1947–1952, is as follows :—

Perth	261
Fremantle	65
Geraldton	15
Albany	7
Bunbury	2
Various inland country centres	26

Thus, about 87 per cent. of cases have been reported from the metropolitan area, but the infection appears to be more or less widespread throughout the State.



TYPHUS FEVER = Notifications & Deaths - W.A.:- 1927-1952

Western Australia—Notifications of and Deaths from "Typhus."

Year.	Notifications Received.			Deaths.		
	Males.	Females.	Total.	Males.	Females.	Total.
(1)—						
1927	....	....	14	1	....	1
1928	....	....	39	2	....	2
1929	....	....	13	....	....	....
1930	....	....	51	1	1	2
1931	....	....	52	....	....	....
1932	....	....	36	2	1	3
1933	....	....	51	1	1	2
1934	....	....	63	....	....	....
1935	....	....	36	....	....	....
1936	....	....	31	1	2	3
1937	....	....	37	....	....	....
1938	....	....	38	3	....	3
1939	....	....	32	1	....	1
(2)—						
1940	....	....	45	1	....	1
1941	....	....	18	2	1	3
1942	....	....	13	1	....	1
1943	....	....	123	4	1	5
1944	....	....	99	2	3	5
1945	....	....	77	3	3	6
1946	....	....	72	1	....	1
1947	....	....	142	2	1	3
1948	....	....	87	2	2	4
1949	....	....	61	2	....	2
(3)—						
1950	....	....	32	....	....	....
1951	13	10	23	....	1	1
1952	13	12	25	1	....	1

Prior to 1927 "typhus" was not classified specifically as a cause of death in W.A.

(1) From 1927 listed simply as "Typhus."

(2) From 1940 classified as "Typhus and typhus-like diseases (rickettsioses)."

(3) From 1950 classified as "Typhus and other rickettsial diseases."

TYPHUS—1927–1952.

Month.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	1949.	1950.	1951.	1952.
January	....	....	....	2	3	2	2	7	3	2	2	5	....	....	....	....	....	10	9	6	7	2	3	1	....	1
February	....	1	3	3	8	3	3	9	1	....	3	2	....	....	....	....	....	11	7	8	12	11	4	3	2	3
March	....	6	1	5	5	3	13	11	5	8	1	6	....	....	....	....	....	12	7	11	15	10	9	7	....	2
April	2	8	3	5	5	7	9	6	9	5	10	9	....	....	....	....	....	12	7	4	16	12	8	8	3	3
May	1	4	1	8	9	6	5	8	6	5	4	5	....	....	....	....	....	15	9	21*	13	21	9	3	5	3
June	3	6	....	6	7	6	11	6	4	4	4	2	....	....	....	....	....	14	4	4	15	10	10	3	4	5
July	1	4	1	1	7	5	3	2	3	3	1	....	....	....	....	....	....	14	6	3	14	5	2	1	6	4
August	1	1	2	4	1	1	3	5	1	1	....	2	....	....	....	....	....	5	3	9	9	1	2	....	3	2
September	....	3	....	4	4	1	....	4	1	....	1	4	....	....	....	....	....	1	6	5	16	1	3	2	....	1
October	5	1	1	5	1	2	1	....	1	....	2	....	....	....	....	....	....	2	13	6	13	1	1	....	....	1
November	1	2	....	1	2	....	1	3	1	1	5	2	....	....	....	....	....	2	1	2	5	3	4	4	....	....
December	....	3	1	7	....	....	....	2	1	2	4	1	....	....	....	....	....	1	5	3	6	10	6	....	1	....
Total	14	39	13	51	52	36	51	63	36	31	37	38	32	45	18	13	123	99	77	82	141	87	61	32	24	25

* It appears that this figure might be 11.

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APPENDIX XIV.

REPORT FROM DR. D. S. MACKENZIE OF THE V.D. SECTION.

To the Commissioner of Public Health.

Although the numbers recorded by statistics are relatively low, I am afraid that we are only getting a relatively small proportion of the infected individual applying for treatment.

The rapidity with which symptoms and signs disappear when treated by antibiotics is apt to suggest a cure when actually there is still latent infection. This is frequently made manifest by an alcoholic bout, when discharge reappears and the condition is then very obstinate, a type of urethritis which, although negative for gonococcus, still, in my opinion, will infect fresh fields.

It must be realised that there is a very large reservoir of infection both for syphilis and gonorrhoea here in this State. Infected men, from a sense of chivalry, will rarely betray their female infectors. Hotel pick-ups, parties and barbecues give us more cases than Roe Street.

Certain areas such as Bassendean Native Camp are infecting localities.

In regard to treatment, the preliminary treatment of primary syphilis by large doses of penicillin (5,000,000 units) followed by arsenic has given good results. Secondhand cases treated on other lines before reaching this Clinic are much more obstinate and we have quite a few " Wasserman fast " cases. I do not use much bismuth as the absorption in most cases is slow and lumps are apt to develop.

In regard to gonorrhoea, three doses of 300,000 units of procillin are used, followed by Solutox for at least 14 days. Results are good.

I have had some little success with Oestrogen and Testosterone mixtures. Most of them gradually improve. None of the antibiotics except possibly terramycin seems to affect the condition.

With women the treatment of gonorrhoea follows the same lines as with men. The addition of Triple Sulpha Cream and Acigel helps considerably.

There are a few case of trichomonas or monilia.

If we could only get the co-operation of the public and full information from all people treating venereal diseases, we could reduce the incidence considerably.

APPENDIX XV.

VENEREAL DISEASE IN WESTERN AUSTRALIA.

1952-1953.

Disease.	Male.		Female.		Total.	
	1952	1953	1952	1953	1952	1953
Syphilis :						
Primary	11	15	4	2	15	17
Secondary....	3	5	3	4	6	9
Tertiary	7	11	7	6	14	17
Congenital	3	....	1	....	4	....
Total Syphilis	24	31	15	12	39	43
Gonorrhoea	134	175	39	14	173	189
Chancroid	2	1	....	....	2	1
Granuloma	*2	2	2	....	4	2
Total	162	209	56	26	218	235

* Native.

APPENDIX XVI.

INFANT HEALTH.

The Commissioner of Public Health.

I have the honour to submit a report on the Infant Health activities throughout Western Australia for the year ending 31st December, 1953.

For the year under consideration 25,041 individual babies attended the Infant Health Centres throughout the State. This number shows an increase as for the three preceding years the numbers were respectively 23,952, 21,879 and 20,075.

Live births reported to the Department for 1953 were 15,857 as against 15,413 for the preceding year. This, therefore, shows that our claim that the vast majority of the mothers with babies attend our Infant Health Centres is justified because our method of record keeping is now such that duplication is avoided. Of course a great number of the extra babies who attended over and above the birth rate are those between the ages of 12 to 24 months, although there is a tendency for the numbers to drop off in this period as the majority of mothers attend regularly up to the baby's 12th month and after that the attendances decrease. The total number of attendances at all Centres was 191,491.

Correspondence Section.

The Correspondence Infant Health section still receives its usual patronage, and this section had on its role 584 new babies and a total of 1,056 individual babies.

2,129 letters were received and 2,210 letters were written in addition to 1,194 circular letters which were sent out to mothers with new babies notifying them that the help of the Centre was available to them.

365 mothers paid visits to the Centre when in Perth and in addition there were consultations with expectant mothers totalling 231.

Telephone consultations were approximately 443. These telephone consultations with the Correspondence Section are very valuable because they are usually with mothers in far distant parts of the State.

In addition to all this office work the Correspondence Nurse visited at regular intervals throughout the year :—

Yalgoo and Murchison Stations.
Mt. Magnet.
Cue.
Big Bell.
Meekatharra
Wiluna
Wittenoom.
Carnarvon.
Onslow.
Roebourne.
Port Hedland.
Broome.
Derby.
Wyndham.
Hall's Creek.
Fitzroy Crossing.
Kimberley Stations.

At the aforementioned places the following children were seen :—

Under 12 months	336
One to two years....	144
Two to six years	185
Expectant Mothers	47
Total	712

These figures do not by any means give a true picture of the value of the work, because whilst it is stated that 336 babies under 12 months were seen, in the majority of cases for a mother to attend it is not merely a matter of the mother deciding to visit the Sister that afternoon in the Clinic. It is frequently a full day's travel, and sometimes considerably more, as many of these mothers in the North-West and Kimberley regions travel a great number of miles to see the Sister. I know of one mother who travelled 250 miles to see the Sister and taking two days for the trip as the roads were so bad, and then having the same return trip to make. Of course most of the visits are not as strenuous as this, but still they do represent a very considerable effort on the part of the mothers so it will be seen that the visits by the Sister are very highly prized and much looked forward to. From the Department's point of view they are extremely valuable as a close contact is kept with the mother thereafter, such contact may be by letter, telegram or in some cases, pedal wireless.

The Sister does these visits to the North-West and Kimberley areas by plane.

During these visits the Sister examines as many pre-school children as possible in addition to the babies.

In addition to giving service to all mothers in the districts mentioned the Sister keeps in contact with all mothers in isolated and scattered places throughout the State.

Also, when an Infant Health Centre temporarily shuts down mothers in the district affected are contacted and notified to keep in touch with the Correspondence section until a new Sister is appointed for their area.

Home Visits.

Home visits paid by the Infant Health Sister to homes where babies are being reared are of vital importance because only in this way can a Sister see at first hand the conditions under which the child is being brought up, and it is of great importance to her to know this when advice and direction are being given to the mother in regard to milk mixtures, etc. These home visits are primarily paid in the metropolitan area because it is not always possible to make such visits in the country, though in the big country towns where it is practicable they are carried out in the same way as in the metropolitan area.

The first visit is paid as soon as possible after the mother comes home from the hospital with a new baby, because at that time the Sister is able to give the mother much valuable help and advice in the care of the child, and also make the contact between herself and the mother, inviting the mother to come to the Centre to see her regularly.

The number of visits paid to homes for the year were 18,176. Unfortunately not as many home visits seem to have been paid the last year or two as previously, but this is due to the greatly increased number of visits to the Centres by the mothers, necessitating the Centres being open somewhat more frequently than previously, consequently cutting down the time allowed to the Sisters for home visiting. This is very much to be deplored and new Centres will be opened as soon as possible to allow the Sisters more time for their visiting.

The difficulty in opening new Centres is not necessarily getting the Sisters to run them, but getting suitable quarters in which to house them.

Telephones.

Whenever a new Centre buiding is erected it is always our aim to have a telephone installed because it has been found that the telephone is of very great advantage to the service we give, particularly in wet weather and when an infectious disease is present in the home. The mother can, by ringing the Sister, get the necessary advice without risking carrying the infection to the Centre. It is a strict rule that no child with any infectious disease is permitted to come to a Centre, and mothers, where there is an infectious disease in the home, are also requested not to come because of the possibility of transfer of infection.

Advices given by telephone from our Centres (excluding the Correspondence section) totalled 4,624.

Breast Feeding Returns.

The Breast feeding figures are much the same as for previous years, and in common with the rest of the world seem to be still somewhat on the decline.

It has always been our concern to encourage breast feeding wherever possible. In fact the Sisters are taught that breast feeding is the rock on which our Centres are built. Some times the rock seems to be just a little stone, but still we keep on persisting and hoping that each new generation that comes along will endeavour to give the child this natural feeding.

It is interesting to note that in some places breast feeding is almost universal, as for example, in the Bickley Valley, where most of the mothers are Seventh Day Adventists and have very strict ideas on feeding. Also it would appear that in the more isolated parts of the State the figures for breast feeding are higher.

The ability to breast feed depends on the person's own standards and point of view and a genuine desire to breast feed. Other requirements are quietness, relaxation and freedom from worry, all of which are factors essential to produce the necessary placidity for normal and natural motherhood. These conditions appear to be very hard to obtain today, particularly in urban life.

In some districts where the breast feeding figures are undoubtedly better than others I think it reflects on the wisdom and enthusiasm of the Sisters in charge of the areas, and the manner in which they encourage and educate the mothers to both establish and continue with breast feeding. Unfortunately, however, we find that a lot of the babies come out of the Hospitals already on the bottle, and when this happens it is very difficult to re-establish the breast milk.

Expansion.

The Infant Health work continues to expand and there are now 45 main Centres from which are run 276 Sub-Centres, making a total of 321 Centres allocated as hereunder :—

Centres—		
Metropolitan, including Correspondence Scheme	22	
Country	23	
		45
Sub-Centres—		
Metropolitan	77	
Country	202	
		279
Total, Centres and Sub-Centres for whole State		325

New Infant Health Centre buildings.

This year, 1953, was an outstandingly important one in Infant Health work as the present Government, when it came into power in May, 1953, established as its principle that it would give financial assistance to all districts wishing to erect an Infant Health Centre building, provided certain conditions were complied with. The amount of money given depended on the individual district, but it was a very considerable sum, and in the majority of cases 50 per cent. and not greater than 60 per cent.

The main conditions laid down for the granting of money were :—

1. The building must be on land vested in either the Government or Local Authorities.
2. The plan and site of the building must be approved by the Public Health Department.
3. The building must be of brick and tile, and must be used for Infant Health purposes only.

Work in connection with Infant Health buildings progressed steadily throughout the State and a vast number of Building Committees were in operation, as the Sisters worked on buildings as their project during my absence abroad in 1952. Consequently the decision by the Government to help financially came at a very opportune time for Infant Health work, and enabled the service to be put on a permanent basis for all time. Obviously then, 1953 was an exceedingly active year in relation to the building programme, and the report for next year will reflect this in the new buildings completed.

Nineteen fifty-three, however, saw some very fine new buildings completed which had been in course of erection prior to the new scheme for finance, though even so in some cases the Government was generous in assisting them to clear up their final debts.

The new buildings opened were at :—

Kalgoorlie, Kondinin, Cranbrook, North Cottesloe, Bayswater.

The following buildings opened also included living quarters for the Sister :—

Collie, Wagin, South Bunbury.

All these places mentioned above are very fine buildings and reflect great credit on the State. Furthermore, the buildings are beautifully furnished with the latest equipment.

Mothercraft Section.

An extra Sister was appointed for this section at the beginning of the year and this enabled the work to be greatly expanded.

These Mothercraft lectures are now given in 20 metropolitan High Schools, Colleges and Convents. It is gratifying to report that the Convents have now come into line and are having these classes.

The work has also expanded enormously in the country districts and 14 of the bigger State Schools and High Schools now have these lectures given by the Infant Health Sisters stationed in their areas. This work is supervised by the Senior Mothercraft Lecturer and, furthermore, she gives refresher courses to the Sisters to keep them up to date in the work.

It is very gratifying to be able to report the tremendous enthusiasm of the children attending these courses of lectures and the rapid growth of this section.

The number of children who were lectured was 1,445 and of these 1,009 received Mothercraft certificates stating that they had attended the lectures. Lectures were given to a total of 68 classes.

The course usually consists of 10 lectures, although there are some that are shorter to suit special needs.

Lectures were also given on Mothercraft during the year at the Teachers' Training College, to St. John's Ambulance Junior Cadets, Kindergarten Teachers, and Perth Hospital (Dietitians).

Two new avenues in connection with this section were started this year. One was the giving of all the feeding lectures to the Alexander Mothercraft Training School. This is a very important section of the work and it is also one that takes up a great deal of time. The other new venture was classes were started for Expectant Fathers—and mothers—one of the conditions for this class being that the wife must be pregnant and that the father must also come. We want to train the fathers to assist the wives in the care of their baby. These classes proved unexpectedly popular and are being very well patronised.

All students attending classes must attend either an Infant Health Centre or the Mothercraft Corner to see the work in operation, this is very valuable.

The Mothercraft Corner is proving a great help, particularly to expectant parents, because they go and see all the things that they need, ask many questions and take measurements of the cot, etc., which the fathers often go home and make.

During the school holidays when the Sisters giving the Mothercraft lectures are not employed on that work they are used for doing locum work for the Sisters in the metropolitan Infant Health Centres during their holiday periods.

Royal Show.

This section of Public Health activities is always very popular with the general public at the Royal Show. A very excellent display was put on last year and staffed by the Infant Health and School Nurses showing the work being done by the Public Health Department for child health in the State.

Leaflets.

These have all been brought up to date and modernised in their presentation. There are three types of leaflets used, one lot for the Mothercraft section, another lot dealing with Infant Health problems and a third lot with the pre-school children.

The leaflets are proving most popular.

Radio Talks.

Talks were organised, as in previous years, and put on over a network throughout the whole State. The talks, which are again proving exceedingly popular, are given as a weekly feature. Our sincere thanks are due to the following stations 6AM, PM, KG and GE for these talks. These talks in no way take the place of visits to the Centres but give advice to mothers who are unable to attend the Centres.

We have been told on many occasions by grandmothers that they enjoy listening to the talks and their previous antagonism to Infant Health Centres has ceased to exist and they have become ardent advocates for Infant Health Centres.

These talks assist in maintaining constant and regular interest in child health. In other words it pays to advertise because people do not become interested until they have a personal and living interest in the problem, such as their own child or a grandchild, therefore, it is essential to keep up these regular weekly broadcasts.

Infant Mortality.

The infant mortality rate for 1953 was the lowest yet for Western Australia, though at 23·83 per thousand live births is still slightly above the Australian rate of 23·30. Taking into consideration the scattered population of the State and often the difficulty in obtaining medical attention in outback areas, the West Australian figure compares favourably with the rates for the rest of Australia hereunder :—

	Per thousand live births.
New South Wales	24·64
Victoria	21·15
Queensland	24·98
South Australia	20·65
Tasmania	22·88
Northern Territory	39·13
Australian Capital Territory	21·57

The highest number of deaths is in the 0–1 month group being 258 for 1953, and only 119 babies died in the 1-12 months group so actually the death rate of children under the care of the Infant Health Centres, *viz.*, from 1–12 months, is low.

Pre-School Section.

The Infant Health Sisters are taking an increasing interest in this section of the work and in some Centres are having special Pre-School days for their mothers to bring the toddlers along, and when the mother has a baby as well she is encouraged to bring the toddler with her so the child can be kept under regular supervision by the Sister. For this purpose special pre-school supervision cards have been printed and a record is kept of each child.

The Sisters have each been issued with a diary and a large number of appointment cards, they give the mother of a toddler an appointment for her next visit, which might be one, three or six months ahead according to the age of the child. These appointment cards keep in front of the mother the necessity to come to see the Sister on the date and at the time specified.

As part of our pre-school programme the School Medical Service now has undertaken the responsibility for the examination of all children at Kindergartens.

Scales.

The position in regard to scales is easier than it has been in as much as quite a considerable number are being imported regularly from Germany. It is hoped that the supply of scales will remain adequate.

Lotteries Commission.

The Lotteries Commission has, as ever, been extremely generous to the Infant Health Service and have provided new scales for quite a few new Centres as well as replacing many of our old sets.

Also the Commission has been most generous towards assisting in the cost of erection of new buildings, and in some cases gave money towards the furnishing of special rooms.

This continued assistance from the Lotteries Commission on behalf of the Infant Health Service is very much appreciated by the Department.

Local Infant Health Committees.

Many towns and suburbs still have a local Infant Health Committee, and particularly is this so where there is an Infant Health building. The Committees are responsible in most cases for the building, furnishing, cleaning and maintenance of the Centre, and for the purchase of a motor car where one is necessary.

The Committees are purely honorary and do a great deal of hard work on behalf of Infant Health activities in their own towns and districts, and the grateful thanks of the Department are due to them for their co-operation.

There is a tendency, however, of latter months for Committees to hand over their responsibilities to Local Authorities. This is because the Committees state that it is very difficult to get younger people to come and take an interest in the work as they all feel it is a Government responsibility.

Many of the Committees have been doing the work for a great number of years and consider that it is now time for other folk to take over. One can see their point of view, and I am only grateful that they have assisted for as long as they have.

Local Authorities.

It continues to be the policy of this Department to encourage all Local Authorities to take an ever-increasing interest in Infant Health activities. It is evident that they are becoming much more sympathetic, and in a great number of instances are prepared to accept a greater responsibility towards this civic service.

In many cases they are assuming the role of the Infant Health Committee, while in other cases they are assisting the Infant Health Committee or, again, assuming the full responsibility for the planning and erection of the building, leaving the Infant Health Committee the responsibility for the furnishing, maintenance and cleaning thereof. It is very gratifying to note this trend of the Local Authorities towards accepting responsibility for the service.

The Government.

The Government has been very generous and interested in this section of preventive Public Health work, and as I have already said, has recognised the great value that it is to the public by this year, for the first time in the history of the State, making available money towards the erection of permanent buildings to house the work.

It has on all occasions granted the requested money for necessary extra staff required for further expansion of the work, as well as paying the Sisters' salaries, mileage rates, overnight expenses and the general petty expenses of the Centre.

Staff.

The staff of the Infant Health service consists of 48 triple certificated Sisters, who have worked untiringly towards furthering Infant Health activities throughout the State.

Conclusion.

I would like to express my sincere thanks to the Sisters of the Infant Health Service for their loyal and faithful service in their Centres. They are an extremely fine band of Sisters who do not count the cost of what they give to their work, but work devotedly and interestedly on behalf of the mothers and babies. They do their work in the spirit of service to the community, and it is a very rare thing indeed to ever hear a complaint from a Sister that she is working too hard. In fact, if anything, they are all the time seeking further avenues whereby they can help the mothers. Many of the Centres are exceedingly large and still the Sisters give of their utmost to the work without complaint as they know the Centres will be divided up as soon as it is at all practicable.

Most of the Sisters in the organisation have been with it for many many years, and speaking generally no Sister is taken on the staff unless she will promise to stay at least two years, because continuity of service with the mothers is one of the great features in the success of the work. I feel completely confident in saying I think Western Australia has one of the very best teams of Infant Health Sisters in the whole of Australia.

This year I was sorry to lose Sister Cole, our first Infant Health Sister, who had been with the service right since its inception. Sister retired from the work with much regret, but as she was past the retiring age and had only stayed on to convenience the Department during my recent absence abroad she felt she should make way for younger Sisters. Both her spirit and her knowledge is a loss to this section.

I extend my grateful thanks to the Infant Health Sisters for their faithful service and very excellent team work.

E. M. STANG, M.B., B.S., D.P.H.,
Medical Supervisor of Infant Health.

ANNUAL SUMMARY, JANUARY TO DECEMBER, 1953.

Centre or Sub-Centre.	Gross Number of Attendances.					Individual Babies Attended.					Birth Notifications Received.	New Babies.	Transferred from other Centres.	Visiting Babies.	Individual Expectant Mothers.
	Under 12 months.	1–2 years.	Total 1 + 2	Over 2 years.	Grand Total 3 + 4	Under 12 months.	1–2 years.	Total 6 + 7	Over 2 years.	Grand Total 8 + 9					
Country :															
Albany	3,858	369	4,227	146	4,373	473	132	605	88	693	382	291	29	83	16
Beverley	3,589	125	3,714	30	3,744	194	148	342	46	388	254	206	17	96	41
Boulder	2,305	99	2,404	45	2,449	268	45	313	26	339	197	146	....	13	....
Bridgetown	2,237	253	2,490	75	2,565	258	81	339	27	366	232	209	14	26	1
Bunbury	3,225	152	3,377	62	3,439	379	27	406	25	431	290	214	17	115	1
Busselton	4,887	375	5,262	57	5,319	325	373	598	96	694	350	280	10	168	17
Collie	2,142	....	2,142	....	2,142	756	....	756	....	756	....	756	....	....	....
Geraldton	3,345	249	3,594	57	3,651	500	57	557	27	584	400	331	30	62	7
Kalgoorlie	4,579	341	4,920	67	4,987	313	265	578	50	628	421	310	11	89	21
Katanning	2,714	88	2,802	47	2,849	310	23	333	10	343	275	224	24	33	12
Kellerberrin	3,923	497	4,420	243	4,663	201	135	336	93	429	268	206	29	94	3
Manjimup	3,081	225	3,306	41	3,347	243	166	409	10	419	253	231	12	58	....
Narrogin	3,090	266	3,356	67	3,423	326	102	428	45	473	313	220	28	62	4
Northam	2,405	158	2,563	25	2,588	338	74	412	22	434	246	185	9	82	....
Three Springs	3,286	540	3,826	156	3,982	210	114	324	102	426	224	221	26	27	50
Wagin	947	56	1,003	38	1,041	306	12	318	24	342	115	116	15	10	8
Waroona	4,025	200	4,225	17	4,242	459	48	507	4	511	294	263	16	99	11
Wyalkatchem	1,478	135	1,613	48	1,661	183	87	270	32	302	219	190	5	8	10
Metropolitan :															
Armadale	5,617	320	5,937	39	5,976	389	164	553	31	584	....	334	36	95	....
Bicton	4,070	181	4,251	274	4,525	366	74	440	75	515	355	301	39	139	4
Claremont	3,455	139	3,594	877	4,471	212	98	310	155	465	236	214	27	91	67
Cottesloe	5,439	136	5,575	80	5,655	435	121	556	106	662	288	262	28	106	3
East Fremantle	3,645	300	3,945	803	4,748	355	47	402	121	523	221	182	27	55	2
East Victoria Park	4,647	229	4,876	72	4,948	508	105	613	45	658	374	348	46	61	2
Fremantle	7,196	679	7,875	669	8,544	555	434	989	230	1,219	524	511	39	82	59
Inglewood	5,404	170	5,574	143	5,717	320	40	360	10	370	329	339	41	94	49
Kalamunda	5,823	295	6,118	25	6,143	427	119	546	20	566	430	311	....	....	....
Kensington	6,338	319	6,657	90	6,747	505	284	789	48	837	277	369	36	137	27
Maylands	6,870	499	7,369	167	7,536	522	182	704	109	813	494	388	52	22	34
Midland Junction	3,842	267	4,109	66	4,175	399	57	456	20	476	396	297	30	54	3
Mount Hawthorn	5,473	417	5,890	242	6,132	355	125	480	149	629	408	349	36	55	36
Mundaring	4,495	422	4,917	154	5,071	294	97	391	33	424	209	181	13	46	70
Nedlands	3,323	95	3,418	66	3,484	125	72	197	12	209	139	137	....	39	3
North Perth	5,074	293	5,367	108	5,475	481	138	619	108	727	603	367	60	115	19
Osborne Park	6,956	290	7,246	17	7,263	704	81	785	8	793	626	433	49	47	....
Perth	4,899	258	5,157	131	5,288	314	63	777	33	810	470	396	44	409	35
South Perth	4,777	378	5,155	231	5,386	1,387	277	1,664	154	1,818	280	219	27	92	12
Subiaco	3,812	352	4,164	423	4,587	304	186	490	213	703	196	230	34	48	26
Shenton Park	3,312	114	3,426	208	3,634	234	48	282	83	365	179	212	13	10	13
Victoria Park	5,613	184	5,797	19	5,816	458	95	553	19	572	465	464	70	207	46
Wembley	5,472	156	5,628	53	5,681	381	88	469	15	484	376	285	28	67	11
Totals	170,668	10,621	181,289	6,178	187,467	16,472	4,784	21,256	2,524	23,780	12,608	11,728	1,067	3,196	723
Correspondence	....	....	....	....	1,421	....	....	....	....	1,056	938	584	....	....	162
Corrigin	....	....	2,531	75	2,606	95	100	195	10	205	175	....	6	8	20
GRAND TOTALS	....	....	....	....	191,494	....	....	....	....	25,041	13,718	12,312	1,073	3,204	905
Previous Year's Total	....	....	....	....	197,207	....	....	....	....	23,952	13,036	....	....	....	850

ANNUAL SUMMARY JANUARY TO DECEMBER 1953.—*continued.*

Centre or Sub-Centre.	Medical Visits.												Advice by Letter.	Advice by Telephone.	Mothers Referred Correspondence Sister.	Lectures Given.	Group Demonstrations.	Deaths.
	Doctor.		Hospital.		Total.		Hospital (No. of Babies.)	Home.										
	Baby Referred.	Mother Referred.	Baby Referred.	Mother Referred.	Babies Referred 16 + 18	Mothers Referred 17 + 19		To Babies, First.	To Babies, Subsequent.	Expectant Mothers.	In-effective.	Total 23 — 26						
Country :																		
Albany	117	12	....	....	117	12	401	36	91	....	3	130	13	87	....	5	2	....
Beverley	29	2	2	....	31	2	274	59	47	2	7	115	1	138	3	20	4	2
Boulder	36	5	....	....	36	5	193	185	18	2	23	228	....	28	....	7	1	6
Bridgetown	22	1	....	....	22	1	156	41	157	3	4	205	....	45	10	....	....	....
Bunbury	23	1	....	....	23	1	272	173	37	1	....	211	....	21	....	10	....	1
Busselton	42	7	1	3	43	10	330	....	....	....	....	....	3	14	9	....	....	2
Collie	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Geraldton	90	13	....	....	90	13	611	200	278	....	45	523	4	414	18	12	....	....
Kalgoorlie	126	30	....	....	126	30	460	136	....	....	....	136	4	325	6	27	9	2
Katanning	46	10	....	....	46	10	312	25	83	7	....	115	....	....	....	....	....	....
Kellerberrin	11	....	....	....	11	....	157	26	252	....	....	278	3	1	....	13	....	....
Manjimup	41	8	....	....	41	8	251	18	....	....	....	18	2	36	....	11	....	1
Narrogin	42	3	....	....	42	3	255	71	22	....	11	104	8	56	8	11	1	1
Northam	24	2	....	....	24	2	119	89	551	1	....	641	....	59	....	18	....	1
Three Springs	63	21	....	....	63	21	146	49	12	9	8	78	26	224	....	....	....	1
Wagin	27	13	....	....	27	13	126	30	46	4	24	104	10	2	12	....	....	1
Waroona	27	2	....	....	27	2	213	3	24	1	....	28	....	....	....	....	....	....
Wyalkatchem	12	3	1	....	13	3	12	6	50	1	....	57	....	12	....	....	....	1
Metropolitan :																		
Armadale	38	10	....	....	38	10	44	71	655	....	12	738	35	75	6	....	....	....
Bicton	57	10	1	....	58	10	....	267	461	9	44	781	....	....	....	....	....	....
Claremont	139	51	3	1	142	52	....	275	864	30	6	1,175	13	82	....	....	....	....
Cottesloe	39	5	....	4	39	9	12	277	250	....	4	531	....	....	....	....	....	....
East Fremantle	93	6	....	....	93	6	....	253	361	....	....	614	3	4	....	....	....	....
East Victoria Park	80	3	....	....	80	3	....	201	104	....	....	305	23	100	....	....	....	....
Fremantle	298	42	....	....	298	42	....	266	239	15	56	576	....	353	....	....	....	....
Inglewood	77	11	....	....	77	11	....	245	163	6	....	414	....	310	....	....	....	....
Kalamunda	....	....	....	....	....	....	....	68	301	....	....	369	....	....	....	....	....	....
Kensington	64	8	....	....	64	8	....	312	340	1	....	653	....	241	....	....	....	2
Maylands	91	6	1	....	92	6	425	516	299	8	54	877	3	19	....	....	....	1
Midland Junction	43	3	....	....	43	3	1	203	132	....	12	347	....	....	....	....	....	....
Mount Hawthorn	28	16	1	....	29	16	....	352	235	2	68	657	2	....	....	....	....	2
Mundaring	59	12	....	....	59	12	....	165	1,492	....	27	1,684	8	17	....	....	....	....
Nedlands	16	1	....	....	16	1	....	107	14	....	....	121	....	110	....	....	....	....
North Perth	57	6	....	....	57	6	....	....	490	383	5	878	....	225	....	....	....	1
Osborne Park	93	12	....	....	93	12	....	527	160	....	95	782	....	....	....	....	....	3
Perth	122	27	2	3	124	30	....	457	140	25	22	644	7	728	3	....	....	....
South Perth	60	4	....	....	60	4	....	159	261	....	50	470	....	303	....	....	....	....
Subiaco	92	30	6	....	98	30	....	204	616	18	8	846	....	38	....	....	....	....
Shenton Park	30	4	5	....	35	4	....	639	138	3	28	808	....	....	....	....	....	....
Victoria Park	96	11	....	....	96	11	....	401	5	....	6	412	....	335	....	....	....	....
Wembley	27	1	....	....	27	1	....	295	76	....	15	386	....	....	....	....	....	....
Totals	2,477	412	23	11	2,500	423	4,770	7,407	9,464	531	637	18,039	168	4,402	75	134	17	28
Correspondence	....	....	....	....	....	....	....	....	....	....	....	....	3,404	443	....	....	....	....
Corrigin	....	....	....	....	173	134	....	61	76	....	....	137	1	222	....	....	....	1
GRAND TOTALS	....	....	....	....	2,673	557	4,770	7,468	9,540	531	637	18,176	3,573	5,067	75	134	17	2
Previous Year's Total	....	....	....	....	2,654	681	....	....	....	....	....	18,644	5,066		....	....	....	....

Appendix XVII.

SCHOOL MEDICAL SERVICE.

The Commissioner of Public Health.

I have the honour to submit a report on the School Medical Service in Western Australia for the year 1953.

The total staff available for this service is, as last year, one administrative officer and five full-time field Doctors, and eight full-time Nurses. One of the field Doctors has been away for some months, but even so it has been possible to carry out a systematic examination of children throughout the State attending High Schools, State Schools, Convents and Kindergartens.

This is the first year that Kindergartens have been included in the examinations when the School Doctors were in their districts.

Also, where possible, all native children at Mission schools have had the same examination extended to them.

For the year 1953, 42,033 children were examined, of which 23,647 were in the metropolitan and sub-metropolitan schools, and 18,386 were in the country schools. These children were examined in 313 schools, which include State Schools, Catholic Schools, Kindergartens and North-West Schools.

The number of children of school age throughout Western Australia in Primary, High Schools and Convents increased considerably this year, by over 7,000 so that the number now stands at 107,700.

It is interesting to note that the total number of children examined, (although this number was higher than hitherto), and notified as having some defect was nearly 3,000 less than last year, the number this year being 14,046. Furthermore, the majority of these defects were slight and mainly called for home attention. A total of 6,563 children were referred for home attention and 3,985 for medical attention. This is really a most satisfactory state of affairs and indicates in my opinion that unquestionably the benefits of the extended school Medical Service throughout the whole State is beginning to show positive results.

Also it is interesting to note that the number of children this year referred for dental attention was less than previously as this year it was 6,259 as against 8,179 for the previous 12 months. It is to be regretted, however, that so many children still suffer from dental defects, but with the constant attention now being given them in this regard, together with more intensive attention to suitable diets, it is hoped that subsequent years will show a marked reduction of this figure.

Two of the main defects amongst school children requiring medical attention are eye and throat and nose defects, but even here the constant supervision is beginning to show results because the numbers again this year are lower than last year as only 637 children were referred for nose and throat defects, of whom 449 were in the country. A total of 1,524 children were referred for eye defects as against 1,652 for the previous 12 months. Of the number referred, 814 were in the metropolitan area and 710 in the country districts.

The rest of the children who were referred for medical attention were suffering from a variety of conditions, such as heart defects, rheumatism, skin complaints, asthma, marked postural or marked speech defects, etc.

The system of sending school children with defective hearing to the Commonwealth Acoustic Laboratory has now been tested and proved satisfactory in this State ; consequently advantage is being taken of this service by the School Medical Officers and the co-operation between the two services is proving most satisfactory and resulting in excellent service and benefit to the children.

During the year, 236 children were referred to this section for detailed testing with the delicate and scientific acoustic instruments available at the Laboratory. At these investigations the type and degree of deafness is ascertained and advice is then given to the parents concerning prognosis and, where necessary, referred for Specialist medical treatment.

Nutrition.

Of the total number of children examined (42,033) it was found that 37,479 were of normal nutrition, 3,297 were above the normal standard and only 1,257, that is 2·99 per cent. were below standard nutrition. This figure is again an improvement on the figures for 1951 and 1952, which were 6·5 per cent. and 5 per cent. respectively, and it is very gratifying that this steady improvement is being maintained, but it is still amazing that there should be any under-nourished children in this State.

Actually it does not mean, in my opinion, that the children are not getting enough to eat, but it does mean that they are not getting the right food to eat. There are still some parents who will persist in giving the children money for school lunches, which so often means a packet of biscuits or a meat pie, instead of going to the trouble of putting up a suitable lunch of the type of sandwiches and food materials as recommended by us—and on which there are pamphlets prepared—to ensure the child receives the correct food value in its meals.

There is undoubtedly still a great deal of room for the education of the parents regarding proper food for their children, and in this connection it is disappointing to note that the Oslo Lunch project, which is worked so extremely satisfactorily in some schools, has not got a wider coverage than it has at the present time. Where there is an interested and enthusiastic Head Teacher with a suitable Oslo Lunch Committee, the children can then be provided with a very satisfactory lunch for about 1s. per day, and this is a much better lunch than most mothers would be able to provide for the same figure. The reason is, of course, that the Oslo Lunch Committee buys all the materials for the lunch in bulk and, therefore, buys at a cheaper or even wholesale rate.

It would be very helpful if the Education Department would actively associate itself with this project and encourage the teachers to establish this lunch in their schools. Once the organisation for the Lunch is done the Teachers do not then have very much work in connection with it, as it is run by a Mothers' Committee known as the Oslo Lunch Committee. The original organisation has to be done by the Teachers as they are the only ones able to make the necessary contacts.

North-West.

Throughout the North-West and the Kimberleys the school children receive a yearly examination because there they are examined by the Public Health Department's local Doctors.

School Nurses.

Owing to the need for extra Nurses, permission was given to increase the School Medical staff Nurses from eight to eleven, and steps were taken to find suitable Nurses to fill these positions. Every Nurse is not suitable for this type of work and it takes time to find a suitable person, because the success of the work depends on the Nurse's suitability and adaptability to this special work, particularly in regard to the home visiting section, and in their relations and approach to those with whom they work, such as the School Teachers and other members of the School team.

Home Visiting.

The Home Visiting, or, as it is so frequently called, the follow-up section, is of paramount importance in the School Medical Service.

As a result of these home visits the condition from which a child is suffering is explained to the parent in a manner which he or she can understand, and, furthermore, the necessity for treatment is emphasised. Also where home attention is necessary the Nurse shows the parents what is to be done and how it is to be done, and in this way sees that the child is properly cared for.

Many parents do not understand what real defect is present in their child, or if they do understand this they frequently do not understand the dangers and troubles which lie ahead for the child should the defect be neglected, but when the problem is explained kindly, slowly, intelligently and sympathetically by the School Nurse they then willingly and actively co-operate. The vast majority of parents are only too anxious to give their child every care and attention.

Unfortunately, however, there is a growing, and fairly rapidly growing, section of parents who do not seem to be able to look after their children in the way that they should, because the mothers need to or are going out to work. It is very difficult for the Nurses to contact these parents to discuss their children's problems with them, and then when the contact is made at their place of work it is often hard to get the parents to obtain the attention because they do not want to lose the day's pay when they take their child along for treatment.

Therefore, it will be seen that the home visiting presents definite problems, but on the success of this work depends very greatly the success of the scheme as a whole.

One can visualise that it may be necessary to cater for parents who work and so the Nurses may be required to take the children—with the permission of the parents, of course—to the Hospitals for treatment as this may be the only way to ensure that the children receive treatment.

A further step would be for the Department to establish Child Health Diagnostic and Treatment Clinics. Such Clinics are an integral part of the work in England, and there they are known as School Clinics. These Clinics save the work of the Hospitals and are established in various sections of a district so the people can quite readily take their children along with very little loss of working time. Such Clinics may only be open for short periods and on certain days, but with the appointment system there is no long waiting periods for the parents.

This is a matter to which consideration will unquestionably have to be given by the Public Health Department, as it would appear the day of both parents working has come to stay.

As the office work in connection with this service has increased greatly it has been found necessary to keep at least one Nurse permanently in the office and another one on call for special investigations which are constantly being carried out. This, therefore, means that there are fewer Nurses available for home visits, because at least five are working with the School Doctors. During 1952, there was only one Nurse available for permanent home visiting, and another one for partial, and this position will continue until we are able to fill satisfactorily the vacancies which now exist on our staff. The number of home visits dropped this year as only 1,534 were paid, of which 1,421 were in connection with children who required medical attention. Of this number it was found that 682 had received the attention by the time the Nurse visited the home, and in the case of a further 339 children this medical attention was immediately promised. Fourteen parents stated they were disinterested, and as usual we found that our " floating " population was very large, because 386 families were either out or had left the district when the Nurse called.

A total of 113 visits were paid to the homes in regard to home attention. These are made in the case of asthmatic children, under-nourished or markedly nervous children, where we require to see the home conditions and have a talk to the mother about the child's problems.

Child Hygiene.

The usual very close systematic supervision was kept by the School Nurses on the cleanliness of the schools, particularly with regard to pediculosis or head infections. Through this constant action the percentage of dirty heads in the State Schools again was lower than hitherto and this year it was reduced from ·4 per cent. to ·2 per cent., and in the Convents from ·9 per cent. to ·8 per cent. These figures were for the whole State and not for the metropolitan area only.

This great improvement has come about through the persistent efforts of the School Nurses, together with the co-operation of the Teachers in the schools. It will be a very happy day for me when I am able to report that the pediculosis percentage in the schools is nil, but I doubt whether that day will ever come though it is nice to hope.

Correspondence Classes.

The principle of examining the children of the Correspondence Classes is still being carried on, and the School Doctor when in a district will see all children who are being educated through the Correspondence Classes if these children are brought in to the nearest State School. Many parents avail themselves of this privilege.

When the Camp School took place at Port Hedland during the year, to which was brought a large number of Correspondence children from all the outlying districts, the local Doctor on our behalf examined all these children. This was an excellent opportunity for getting in touch with children living in scattered and isolated places. A Doctor will do an examination of the children at all future Camp Schools.

Association with Silver Chain.

Arrangements are being made in outlying places with the Silver Chain and Bush Nursing Association where a Silver Chain Nurse is stationed, of which there are now four, for these Nurses to keep an eye on the school children for us in regard to hygiene. The Nurses will do all follow-up work after the visit by the School Doctor. This scheme is so far working very smoothly but it is only to be in force until such time as Regional areas are established in School Medical work and our own staff assume responsibility for the work.

Thanks are due to the Silver Chain Association for their co-operation.

CONCLUSION.

Interested organisations still continue to ask for an annual medical examination of school children, which is interesting as it shows that the public realises the value of this essential service even although it receives very little publicity. In conformity with experience in other countries I do not think a yearly examination in our State is warranted, but the service which we are now giving seems to be very satisfactory and is working smoothly.

The difficulty, of course, is to give the service to the country areas because officers do not like being away from their homes for long stretches of time and having to " live in a suitcase." Travelling on day by day and week by week is extremely wearing, particularly for women who are unable either to do or get their washing done because they are never is a place long enough. Also they miss all the comforts and amenities of a home. The majority of hotels do not provide anything more than the bare essentials. As a result of this it is difficult to get staff agreeable to carrying out this country work which involves, from a School Medical point of view, continuous travelling and never being settled in one place for any length of time.

I consider that the School Medical Service will always be necessary, even if a National Health Scheme or Free Medicine does come into force as it is amazing the number of medical defects which children have of which the parents are completely unaware. Therefore, unless the parents were trained to take the children to their own Doctors for a yearly checkup, and I doubt whether this will ever come, in the interests of public health the School Medical Service will always be necessary. In fact, with the rapidly increasing population that we have in this State it is obvious that the service will have to grow and expand with the State.

It must always be borne in mind that the essential function of the School Medical Service is " preventive," and it aims at achieving and maintaining health and correcting those physical and functional faults which lower the health potential of the child leading to established ill-health in the adult. Our object must always be to see to it that our children have all or any defects corrected and corrected as soon as possible in their life so that they are in as perfect a state of health as possible. Then by constant supervision we must see to it that they are kept at their maximum of physical efficiency. Our motto is " Keep the Well Child Well."

Visits should be paid to the homes of all children who have been notified as having some defect which requires medical treatment or which requires special home attention, and these visits should be made by the School Nurse within a reasonable time after the Doctor's examination. At the present time our School Nursing staff does not enable this to be done, but it is hoped that with the extension of the service this will be possible.

The School Doctors report that in the majority of cases they receive great co-operation and help from the School Teachers, who are appreciative of the examination, but even so closer co-operation between the Education Department and the Public Health Department is necessary. At the present time the School Medical Officers are conducting their examinations under extremely trying conditions due to the overcrowded state of the schools and it is hoped that as soon as possible properly equipped medical rooms with adequate lighting, heating and medical facilities will become available. Also that where medical rooms have been built they will be made available to us for our work when in the schools.

At present owing to the excessive overcrowding of the schools it has been found necessary by the Teachers to use these rooms for other purposes.

Last year I said, and again I repeat, that I think we have every reason to be proud of the School Medical Service which covers the vast area of our State and which compares favourably with other countries . Nevertheless we must not be complacent and must never cease to endeavour to expand the scope and value of this service even more, because on the health of our children depends the health of our State.

For this reason I would very much like to see come into force School or Child Health Clinics, established along suitable lines, in all large towns. Such Clinics would not run continuously but at set times on certain days. I think they would serve a very useful purpose.

In conclusion I would like to say how sorry the School Medical Service is at the retirement of Sister Piesse, who has been the backbone of the School Nursing Service for the 30 years she has been with it. Her unswerving loyalty and interest in the work has helped to build it into the strong and useful service that it now is. Her influence in the service will be felt for many many years, even although those working in it will not themselves realise it because they did not have the benefit of working with her.

I would like to publicly express my deep gratitude for her loyal, efficient and willing service both to myself and the organisation over this long period, and her retirement is a genuine loss to the service, not only because of her personality, but because of her extensive knowledge of the work.

I would like to thank the School Doctors who have worked well and faithfully under the most difficult conditions.

The School Nurses also have my sincere thanks for the excellent work that they have done.

E. M. STANG, M.B., B.S., D.P.H.,
Senior Medical Officer of Schools.

Appendix XVIII.

SCHOOL MEDICAL SERVICE.

Examination of Metropolitan and Country School Children, 1953.

——	Number Ex-amined.	Number Notified.	Number referred for Medical Atten-tion.	Number referred for Home Atten-tion.	Number requir-ing Dental Atten-tion.	Skin Complaints.		Nutrition.			Eyes Medical Atten-tion.	Tonsils Medical Atten-tion.
						Number.	Per cent.	3.	Under 3.	Over 3.		
						Metropolitan Schools.						
Boys	11,717	3,721	1,023	1,761	1,504	....	....	10,710	332	675	....	....
Girls	11,930	3,642	1,085	1,763	1,503	....	....	10,617	338	975	....	....
Total	23,647	7,363	2,108	3,524	3,007	1,104	4·67	21,327	670	1,650	814	228
						Country Schools.						
Boys	9,471	3,499	978	1,549	1,681	....	....	8,483	370	618	....	....
Girls	8,915	3,184	899	1,490	1,571	....	....	7,669	217	1,029	....	....
Total	18,386	6,683	1,877	3,039	3,252	666	3·62	16,152	587	1,647	710	409
						State Total.						
Boys	21,188	7,220	2,001	3,310	3,185	....	....	19,193	702	1,293	....	....
Girls	20,845	6,826	1,984	3,253	3,074	....	....	18,286	555	2,004	....	....
Total	42,033	14,046	3,985	6,563	6,259	1,770	4·21	37,479	1,257	3,297	1,524	637

Appendix XIX.

SCHOOL DENTAL SERVICE.

The Commissioner of Public Health.

Following is my report on the activities of the School Dental Service for the year 1953.

STAFF.

The position has steadily deteriorated ; the establishment is 14 and although we have never yet succeeded in filling all positions we did have 12 Dental Officers at the end of 1952 ; however, at the end of 1953 we had only eight, leaving six vacancies.

Facts and Figures are as follows :—

Number of country schools visited	135
Number of metropolitan schools visited	16
Number of country orphanages visited	11
Number of metropolitan orphanages visited	13
Number of children examined	9,368
Number of children treated	6,280
Number of children who needed no attention	1,868
Number of children who were to receive private attention	483
Number whose parents desired no treatment to be done	737

Operations performed.

Silver Amalgam restorations (fillings)	6,771
Copper Amalgam restorations	1,694
Cement restorations	1,864
Porcelain restorations	733
Silver Nitrate treatments	1,418
Other conservative treatments	7,464
Extractions	14,844
Prophylaxis	704
Talks, personal interviews, etc.	825

Government Institutions were visited regularly by the Senior Dental Officer or the Acting Senior Dental Officer. Work done at these places was as follows :—

Claremont Mental Hospital and Lemnos.

Appointments	361
Extractions	229
New dentures constructed	14
Repairs to dentures	30
Prophylaxis	16
Restorations	1

Heathcote.

Appointments	458
Extractions	101
Prophylaxis	6

Wooroloo Sanatorium.

Appointments	359
Extractions	108
Restorations, etc.	9
New dentures constructed	21
Dentures repaired	12
Prophylaxis	18

Fremantle Prison.

Appointments	240
Extractions	193
Restorations	10
New dentures made	6
Dentures repaired	10
Prophylaxis	7
Other treatments	20

A. G. McKENNA,
Senior Dental Officer.

Appendix XX.

HOSPITALS.

Commissioner of Public Health.

I have the honour to present the following report on the activities of the Nursing Branch for 1953.

During the year 67 visits were made to Departmental and Non-Departmental Country Hospitals, including a tour of Hospitals in the Murchison District. The North-West Hospitals were covered by a visit from a Senior Officer of the Medical Department.

Six monthly inspections of all Private Hospitals were carried out for registration purposes, and the usual monthly inspections of Maternity Home case books attended to.

Improvements and additions have been made to the following hospitals :—

Departmental Hospitals.—Katanning, Bunbury, York, Hawthorn.

Non-Departmental Hospitals.—Three Springs, Morawa, Mullewa, Armadale.

Private Hospitals.—Lister, Coleraine Hospital, Katanning.

Stirling Hospital, Bunbury, was leased to Matron Terry.

The Carnarvon Hospital was completed and opened during the year and the Nurses Home at the Three Springs Hospital was opened in December.

The new Lake Grace Hospital functioned as a Board Hospital for only 12 months before coming under Government control.

After the completion of the extensive alterations at Woodside Hospital, patients were transferred from Bundi Kudja and San Hedrin Hospitals, which are now no longer functioning. Matron Leggatte is in charge of Woodside Hospital.

Matrons appointed to Departmental Hospitals.

Miss Shirley to Wagin, Miss Mathews to Busselton, Miss Dunstan to Denmark, Miss Corker to Carnarvon.

raduate Scholarships.

Two Government Scholarships were awarded for the Nursing Administration Course and one for the Midwife Tutor Course, tenable for one year at the College of Nursing Australia, Melbourne.

1952 *Scholarship Student Appointments.*

Miss Lambert was appointed Matron, Pinjarra Hospital.

Miss Mann was appointed Assistant Matron, Kalgoorlie Hospital.

Sister's Refresher Course.

In May a Refresher Course for Supervising and Ward Sisters was organised by the A.T.N.A. in co-operation with the Medical Department and was well attended by Sisters from Departmental, Non-Departmental and Metropolitan Hospitals. An effective contribution could be made to nursing if such courses could be conducted annually.

Matron's Refresher Week.

The Matron's Refresher week could not be held this year and this omission was regretted by the Matrons who would benefit from an annual course of lectures and discussions.

Nursing.

Country Hospitals have again this year experienced difficulty in obtaining sufficient trained nurses. This has an effect on the standard of nursing care available to patients and is most acutely felt in the small hospitals where the limitation of staff restricts to some extent the admission of patients, particularly those requiring non-urgent surgical treatment.

Nursing Training.

The lack of permanent senior Sisters in the country Training Hospitals affects the training of Nurses. Clinical supervisors and " A " Class Sisters are essential in order that steady and continued supervision of practical work may be maintained and the Student Nurse assisted in correlating theory with practice in nursing. This is done effectively at the Kalgoorlie, Geraldton and Northam Hospitals, where clinical supervising Sisters have been appointed.

Miss Harler, the Organiser of Nursing Training, made 24 visits to Training Hospitals during the year, the duration of visits being two days to one week depending on the size of the Hospital. Miss Steel, Senior Tutor visited Kalgoorlie, Geraldton and Northam Hospitals.

Details of Training during 1953.

Students	Intake.	Terminated in P.T.S. at 1 month.	Terminated subsequent to preliminary Period.
25th P.T.S.	17	3—2 diverted to Nursing Aide Course	1—good Nurse failed Anatomy and Physiology.
26th ,,	16	....	1—Male Nurse not suitable. 2—Resignations (1 Marriage).
27th ,,	20	2—Terminated (1 previously Northam Hospital Assistant Nurse), (1 previously Kalgoorlie Hospital Assistant Nurse) 2—Nursing Aides	
28th ,,	20	2—Kalgoorlie dismissed	2—Resignations.
29th ,,	10	3—Nursing Aides	
Totals	83	12	6
		6—Doing Nursing Aide Course	1—Doing Nursing Aide Course.

Results of First Professional Examinations.

	Passes.	Failures.
April, 1953.—		
Kalgoorlie	5	1—2nd failure in Hygiene—Married.
Northam	3	1—1st Failure in Hygiene.
Geraldton	5	
Collie	1	
August, 1953.—		
Kalgoorlie	4	
Narrogin	2	
Collie	2	
Geraldton	3	
Northam	3	
December, 1953.—		
Kalgoorlie	7	
Northam	3	
Geraldton	4	1—1st Failure in Anatomy and Physiology.
Narrogin	3	
Collie	2	

Nurses Completing Training and the Results of the Nurses Registration Board Final Examinations.

February, 1953.—	
Kalgoorlie	16 passes with 6 credits.
Northam	2 passes.
Geraldton	3 passes.
June, 1953.—	
Kalgoorlie	3 passes.
Northam	1 pass.
Geraldton	1 pass.
October, 1953.—	
Kalgoorlie	9 passes with 2 credits.
Northam	3 passes
Geraldton	1 pass.

Total completing Training 39. No referrals.

The painstaking work of the lecturers and tutors is reflected in these excellent results and their efforts are greatly appreciated. The Senior Tutor, Miss V. Steel, is to be specially commended.

Recruitment.

During the year Miss Harler made regular visits to the High Schools at Busselton, Bunbury, Collie, Narrogin, Northam, Merredin and Geraldton, where she gave talks on nursing to senior girls. Talks were also given to Junior Red Cross groups. It is hoped to obtain the co-operation of Matrons in these districts in inviting the school girls to the Hospitals for talks, tours of inspection and contact with patients, when their interest in nursing may be stimulated. Although the publicity thus given does not recruit Nurses for the Government Nursing Service exclusively, it is very valuable in that information is also given in respect of the Metropolitan Training Hospitals.

Central Training School Prospectus.

A well set out Prospectus has been printed and should be of value in recruiting. Headmasters and Vocational Guidance Officers have found the information supplied useful and further copies have been requested. Copies have been sent to Road Board Offices and C.W.A. sections throughout the country.

The weekly advertisement appearing in the " West Australian " obtains results and should be continued, but in spite of these efforts we are getting insufficient applicants and are unable to train sufficient Nurses to meet the requirements of the Country Hospitals.

Nursing Procedure Manual.

A Nursing Procedure Manual has been compiled for the use of students and staff of Government Training Hospitals and is designed to effect the observance of standard practical nursing procedures.

Students' Name Badge.

An innovation new to W.A. was introduced at the Central Training School in the form of a name badge worn by the Student Nurse ; the 26th Preliminary School of May being the first to be so equipped. The badge which shows the Nurse's initials and surname is an aid to recognition and is appreciated by Doctors, patients and the students themselves.

Associated Training.

During the year four nurses who had gained portion of their training at other hospitals were accepted by Government Training Hospitals for completion of Training.

Heathcote Reception Home Training.

Four Nurses successfully completed their preliminary training at the Central Training School.

Accommodation at Central Training School.

Some alterations were made during the year in order that more bedroom accommodation may be provided for students. Thirty-six (36) Nurses may now be housed, but this is still short of requirements, some having to live out when a large Block and large Preliminary Training School receive instruction concurrently. Classroom accommodation is limited and imposes a strain on both lecturer and students.

The Organiser of Nursing Training now lives out.

In July, lectures and demonstrations in elementary bacteriology were commenced with the introduction of the revised Personal and Communal Health syllabus, this series being given by the staff of the Public Health Pathology Department.

The teaching staff of the Central Training School wish to express their appreciation for the co-operation they received from all the lecturers and also their thanks for the kindly co-operation of the members of the Chest Clinic, Medical and Public Health Department staffs.

Post Graduate Lectures.

In response to several requests from Trained Nurses who had been absent from the active nursing field for some years and who wished to be acquainted with modern drugs and nursing techniques, it was arranged that a class should attend the course of lectures given to Second Year Nurses at the Central Training School. It is not known to what practical use this revision was put and there have been no further requests for a similar course of instruction.

Nursing Aide Training.

Early in the year, the Nurses' Registration Board approved of a course of training for Nursing Aides and the Merredin Hospital was approved as a Training Centre.

The first School comprised 13 students and commenced on the 2nd March, 1953 ; the second School comprised 8 students and commenced on the 4th May, 1953 ; the third School comprised 5 students and commenced on the 21st August, 1953 ; so that during 1953 26 Student Aides commenced the Course. Of these, 16 withdrew for various reasons, two of whom transferred to General Training, leaving 10 to complete the Course. It is generally accepted that wastage is high in this grade of Nurse.

In conclusion, I wish to express my thanks to you for the kind encouragement you have shown in my work and to record my appreciation of the loyal co-operation given by Miss Railton, Assistant Matron.

P. F. LEE,
Principal Matron.

APPENDIX XXI.

NURSES REGISTRATION BOARD.

31ST DECEMBER, 1953.

Eleven meetings were held at the Department of Public Health.

The number of nurses registered in the various divisions of the register whose registrations were in force at the end of the year was :—

	1953.	1952.
General	2,397	(2,040)
Infant Health	202	(174)
Mental	51	(41)
Midwifery	1,144	(1,010)
Tuberculosis	61	(44)
Mothercraft	25	(14)

Figures in parenthesis are those of 1952 for comparison.

In addition, 45 nursing aides were enrolled under section 5 (5e) of the Act.

Twenty-one examinations were conducted, as follows :—

General	3
Mental	3
Midwifery	3
Tuberculosis	3
Mothercraft	3
First Year Professional	3
Educational	3

In regard to mothercraft nurses, during the year a reciprocal registration agreement was entered into with the Hospitals and Charities Commission, Victoria.

APPENDIX XXII.

INSECTS OF MEDICAL IMPORTANCE IN WESTERN AUSTRALIA.

By Dr. D. J. R. Snow.

I. INTRODUCTION.

There is little on record concerning insects of medical importance in Western Australia. Whereas a great deal is known about the types and distribution of anophelines, the nature of periodical mosquito plagues, "sand-fly" pests, and similar insect problems elsewhere, knowledge of these within our own State is seriously deficient. It has therefore not been possible to design intelligent control measures.

Twenty years ago a virulent epidemic of malaria in the Fitzroy Basin killed 15 white settlers and at least 200 aborigines. The mosquito vector was never identified. Indigenous malaria has not been conspicuous since, but the chance of efficient and infected vectors being introduced from countries to the north has increased immeasurably with the speed of air travel, while the entry of human carriers is always a possibility. Dengue fever has occurred in outbreaks at various north-west ports, while periodical mosquito and "sand-fly" plagues in these parts have been a considerable nuisance. Yellow fever and mosquito-born encephalitis have not been recorded, and filaria does not occur. The main hazard against which some safeguard is required is therefore malaria.

II. THE OCCURRENCE OF MALARIAL VECTORS.

At least one dangerous vector, *Anopheles punctulatus farauti,* is known to occur in North Queensland and the Northern Territory, but its presence, distribution, and breeding places in Western Australia remain matters for investigation. Further, little or nothing is known about other Anophelines in the Kimberley region.

In April, 1951, the question of an entomological survey of the Kimberley region was taken up with the Federal Authority. Owing to commitments elsewhere and unsuitable weather in the north, the project had to be postponed. The School of Tropical Medicine in Sydney was particularly interested in a wet season survey to discover the distribution and westward range of *Anopheles punctulatus farauti,* and was prepared to include the Kimberleys in a project if circumstances permitted.

The question was taken up again in 1952 and, failing the despatch of a Commonwealth team of experts, it was suggested that North-West Medical Officers might collect the necessary specimens aided by directives and instructions from the Sydney School. While being an unsatisfactory approach, it was felt that by this means some useful information could be assembled. Nothing came of this project.

Early in 1953 steps were taken to train an Inspector (Mr. E. J. Britten) in the identification of mosquitoes ; and for this purpose he was attached to the University Entomologist (Dr. Hodgkin) for special instruction. In April it was learned that arrangements had been concluded by the Sydney School of Tropical Medicine and Public Health to send a skilled entomologist through the Northern Territory to the Kimberleys on a limited survey. Mr. Britten was sent to Ord River to join him, and these two officers surveyed several locations from Ord River to Broome.

Their investigations disclosed the presence of *Anopheles annulipes, Anopheles amictus hilli,* and *Culex annulirostris* in rice bays both at the Kimberley Research Station near Wyndham, and at Liveringa near Derby. It was remarked that rice cultivation at these two places led to the prolonged prevalence of anophelines, because water persisted in the rice bays after all natural waters had dried up. It is significant that both the anophelines detected are regarded as "potential" vectors of malaria under locally favourable conditions.

Owing to inadequate rains, insufficient time, and the fact that the investigation was undertaken somewhat later than was hoped, the findings were not regarded as truly representative. Further, *Anopheles punctulatus farauti* was not found.

A more comprehensive survey was therefore planned for the following wet season. This survey has now been made by Dr. E. P. Hodgkin, Reader in Entomology at the University of Western Australia, assisted by Mr. E. J. Britten. Their report is reproduced elsewhere.

It reveals that although *Anopheles punctulatus farauti* was not found, a number of potential vectors of malaria were recovered. These included *Anopheles annulipes, Anopheles amictus hilli, Anopheles amictus amictus,* and *Anopheles bancrofti bancrofti.*

These findings are important. There may be no malaria in our tropical territory at present, but the introduction of human carriers aided by favourable conditions for mosquito breeding, might well result in an epidemic. The habits and breeding places of most malarial mosquitoes are specific. If the types of anopheline mosquitoes which inhabit the area are known in advance, swift and selective control will be greatly facilitated when occasion demands.

III. PERIODICAL MOSQUITO PLAGUES.

From time to time a veritable plague of mosquitoes overtakes one or other of the small north-west settlements. The town of Derby seems to suffer most. Often, following a few days after rain, swarms of mosquitoes make life intolerable for several days. The cause of these plagues has not been determined, nor has the species concerned been identified. Despite several requests, a representative collection of these insects has not been obtained, and attempts to secure specimens are being renewed. Owing to the brief duration of these plagues it has not been possible to arrange for a visit to the area by a skilled investigator at the right time ; but identification of the species will give some indication of the likely breeding places. Only when these have been located will satisfactory control be practicable.

IV. THE " SAND-FLY " NUISANCE.

The so-called " sand-flies " of the North-West coastal strip are in fact members of the genus Culicoides. At least one species has been identified (*Culicoides ornatus* Taylor ; obtained from Port Hedland in 1947). Recent collections by Dr. Hodgkin and Mr. Britten have disclosed the presence of other species.

Apart from their nuisance value because of prolonged irritation from bites, the development of secondary infections from scratching and contamination has been a considerable problem, especially among newcomers to the area.

The habits and breeding places of these pests have been the subject of special investigations in America, where it is a problem in the tropical south, but little or nothing is known about our local varieties. In the past, aerial spraying has been suggested and considered, but until places, breeding times and other particulars have been established, expensive measures such as this cannot be recommended.

V. SUMMARY.

Investigations during the period under review have disclosed the presence of several species of mosquitoes capable of transmitting malaria in the Kimberley region. Further studies will be necessary before safeguards can be devised. More information is required about the occasional mosquito and " sand-fly " plagues at the North-West ports if control is to be attempted intelligently.

Appendix XXIII.

A SURVEY OF THE MOSQUITO FAUNA OF TROPICAL WESTERN AUSTRALIA

BY

Ernest P. Hodgkin, Reader in Entomology, Department of Zoology,
University of Western Australia

AND

Eric J. Britten, Health Inspector, Department of Public Health,
Western Australia.

INTRODUCTION.

The purpose of this survey was to study the mosquitoes of the northern parts of Western Australia, with special reference to potential disease carriers and nuisance mosquitoes. It was proposed to collect as widely as possible in order to map the distribution of the various species, to assess the availability of the breeding places and the utilisation of the limited surface waters in this largely arid part of the State, and to study the biology of larvae and adults, as much as was possible in the limited time at our disposal. Other noxious insects were to be collected as opportunity permitted.

Brief visits of up to a week were made to a number of localities during four weeks in February and March, 1954, and in June a further visit was made to one place. No special search was made for adult mosquitoes, although they were caught whenever they attacked, and some resting mosquitoes were caught during the day. Attention was directed mainly to the search for larvae. Where there was little water, as at Roebourne and Derby, it was possible to search all the surface waters located ; where water was more plentiful it was only possible to sample the different types of natural waters.

LOCALITIES VISITED.

Onslow—24th to 25th February.

Only an overnight stop was made here. *Aedes tremula* was caught in the hotel in the early morning and the larvae were found in a rain-water tank.

Onslow was extremely dry. The only surface water which we were shown was a pool in the river bed, about a mile from the town, where the water contained crystalline salt. No larvae could be found, though we were told that larvae had been numerous here earlier and that after rain there are " swarms " of mosquitoes.

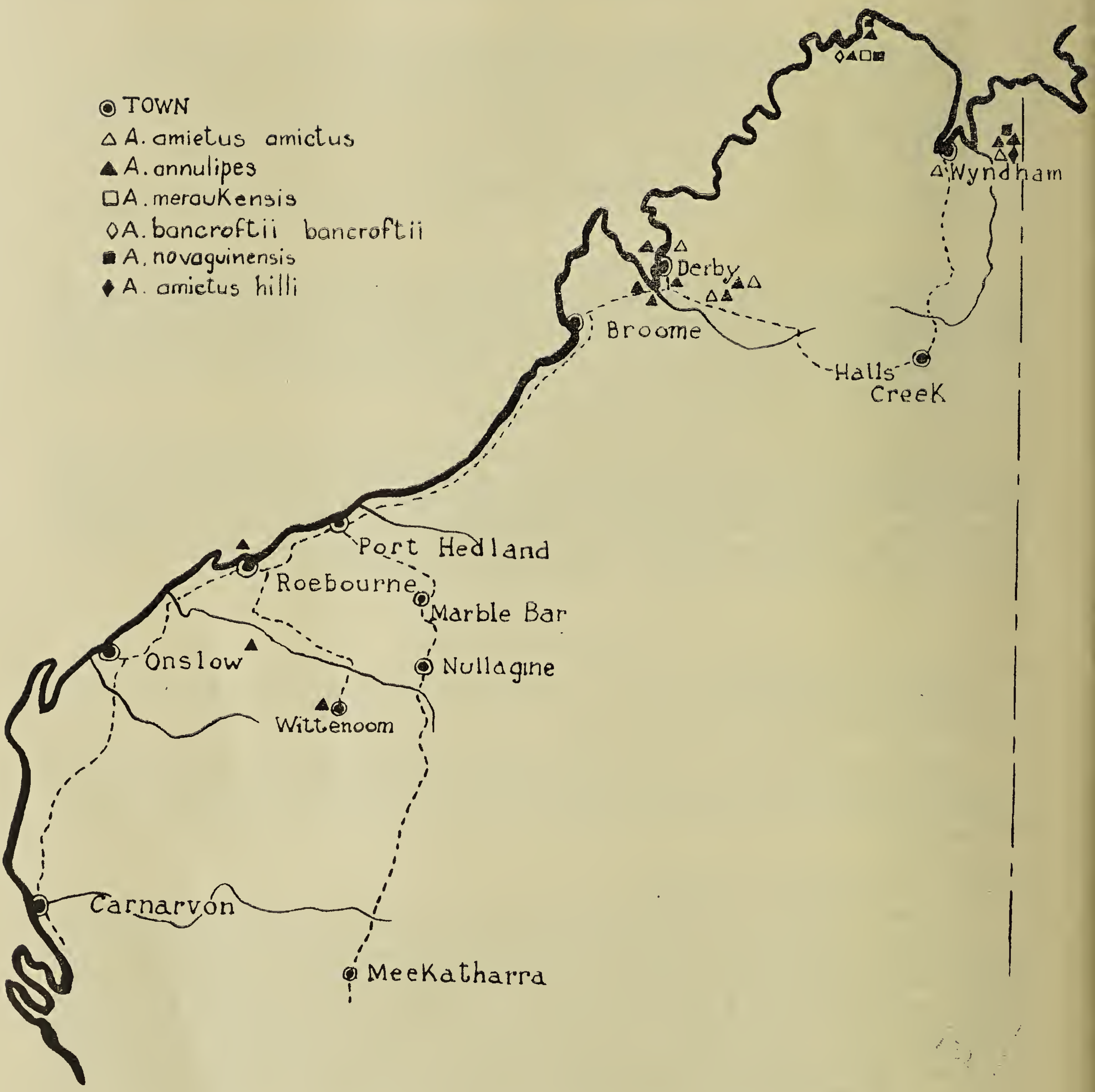
Roebourne—25th February to 3rd March.

We were informed that the long dry spell had left the river with only a little water in the deeper pools in January. The heavy rain at the end of that month had caused the river to flow, and at the time of our visit there was water in the river bed for about half a mile above the hotel. The water was flowing slowly, sometimes over the surface where there was rock, or filtering through the sand from pool to pool. It lay in large pools with water plants, smaller pools with sandy and muddy bottoms, small excavations in the sandy bed of the stream, small pools that were rock-enclosed, and a few that had become fairly foul with decaying matter. In all of these, except the last, larvae of *Anopheles annulipes* and *Culex annulirostris* were found. In the smaller pools there was heavy breeding of both species, but larvae were more difficult to find in the larger pools which were well stocked with predators (small fish and various insects and their larvae). These were the only species, apart from a single larvae of *Aedes tremula* found in a rock pool.

The only other natural fresh waters we could locate were pools in the sandy bed of a creek (Barley Bree) some miles from the town. There were abundant predators in these and no mosquito larvae were found. There were reputedly clay pans still holding water some distances from the town, but no one could direct us to one of these. About half a mile below the town the river bed opens out and the water would appear to be slightly brackish. No larvae were found in the river itself, but in a small isolated pool larvae of *Culex sitiens* were found (the larvae were typical in some respects but unfortunately no adults bred out for us to check the identification).

Short visits were made to the coast at Point Samson and Cossack, but no mosquito breeding places were found.

Aedes tremula was a source of annoyance in the early morning and heavy breeding was found in underground rain-water tanks. *Culex fatigans* was also caught in the early morning ; it was probably breeding in water tanks, but the larvae were not found. Adult *A. Annulipes* were also caught.



DISTRIBUTION OF ANOPHELES SPECIES IN NORTH-WEST AUSTRALIA

Millstream Station—1st March and 17th to 24th June.

This station lies on the Fortescue River about 80 miles south of Roebourne. Close to the station homestead there is abundant water from permanent springs which feed several large pools, extensive swamps and many streams. In the surrounding countryside there is no permanent water for many miles. Clay pans in the river beds hold water for several months after rain, scour pools in the creek beds probably persist for a few weeks, " crab holes " in open country are said to hold water for some time after heavy rain (they were without water during our visits), but in none of these does water normally remain through the long dry period in the latter half of the year.

No larvae were found in the more heavily overgrown swamps, in the fast running streams, in the large pools (which are steep-sided), or in the clay pans, with one exception. In this clay pan *A. annulipes* larvae were found in weed mats ; most of the other pans were devoid of vegetation.

The larvae of only six species of mosquito were found as the result of a thorough search in June ; there are probably others in summer. *A. annulipes, C. annulirostris,* and *C. pipiens australicus* were common in the shallow waters of clear pools and open swamps ; *C. bitaeniorhynchus* was found breeding in seepage pools with filamentous algae. *C. fraudatrix* larvae were found in small clear pools, including some under heavy shade from trees. *A. annulipes* was abundant in all the above places. In scour pools in sandy creek beds *A. annulipes, C. pipiens australicus* and *Aedes Pseudo-normanensis* were found. The last named species was only found in these pools.

In June the adults of three species were caught in the house at night, both biting and coming to lights : *A. Annulipes, C. annulirostris,* and *C. bitaeniorhynchus.* Only *C. annulirostris* was caught biting out of doors, both by day and at night.

Wittenoom Gorge—1st to 2nd March.

Here again there is much permanent water, in deep pools in the river bed and a few small streams and swamps. We had time only for a very superficial search of the more important natural waters. These were : a swampy stream near the head of the gorge with a muddy pool below, and large pools in the river bed with clear and relatively cool water under the overhanging cliffs. Larvae of *A. annulipes* and *Culer crinicauda* were found. Adult *Culex basicinctus* were resting on the rock face above one of the large pools.

Derby—4th to 9th March.

We found very little fresh water in the immediate vicinity of the town, and at the time of our visit there did not appear to be any salt or brackish water that was not washed out daily by the tide (springtide on 8th March).

Myall's Bore gives rise to a permanent stream and swamp ; this is close to the aerodrome. *Anopheles amictus amictus* and *C. annulirostris* were found breeding here.

Extensive open swamps at Yabergoodie and on the Derby-Yeeda road contained muddy water that was probably somewhat brackish, no larvae could be found in these. Pools in Yeeda creek, with fresh muddy water, and large pools and swamps at Langie crossing yielded many larvae of *A. annulipes* and *C. annulirostris.*

Breeding of *Aedes aegypti* and *notoscriptus* was found in tree holes at the Leprosarium ; the holes were supplied with water by the garden sprinklers.

At the time of our visit the only nuisance mosquito in Derby town appeared to be *Aedes tremula.* A fortnight later mosquitoes were said to be very abundant. The larvae of *Ae. tremula* were not found despite repeated search of domestic water containers. Adults of *Ae. tremula* and *notoscriptus* were found resting in the " prison tree " at Myall's bore. Larvae of *A. annulipes, C. fatigans,* and *C. annulirostris* were found in a partially constructed septic tank in the town.

Kimberley Downs Station—4th to 6th March.

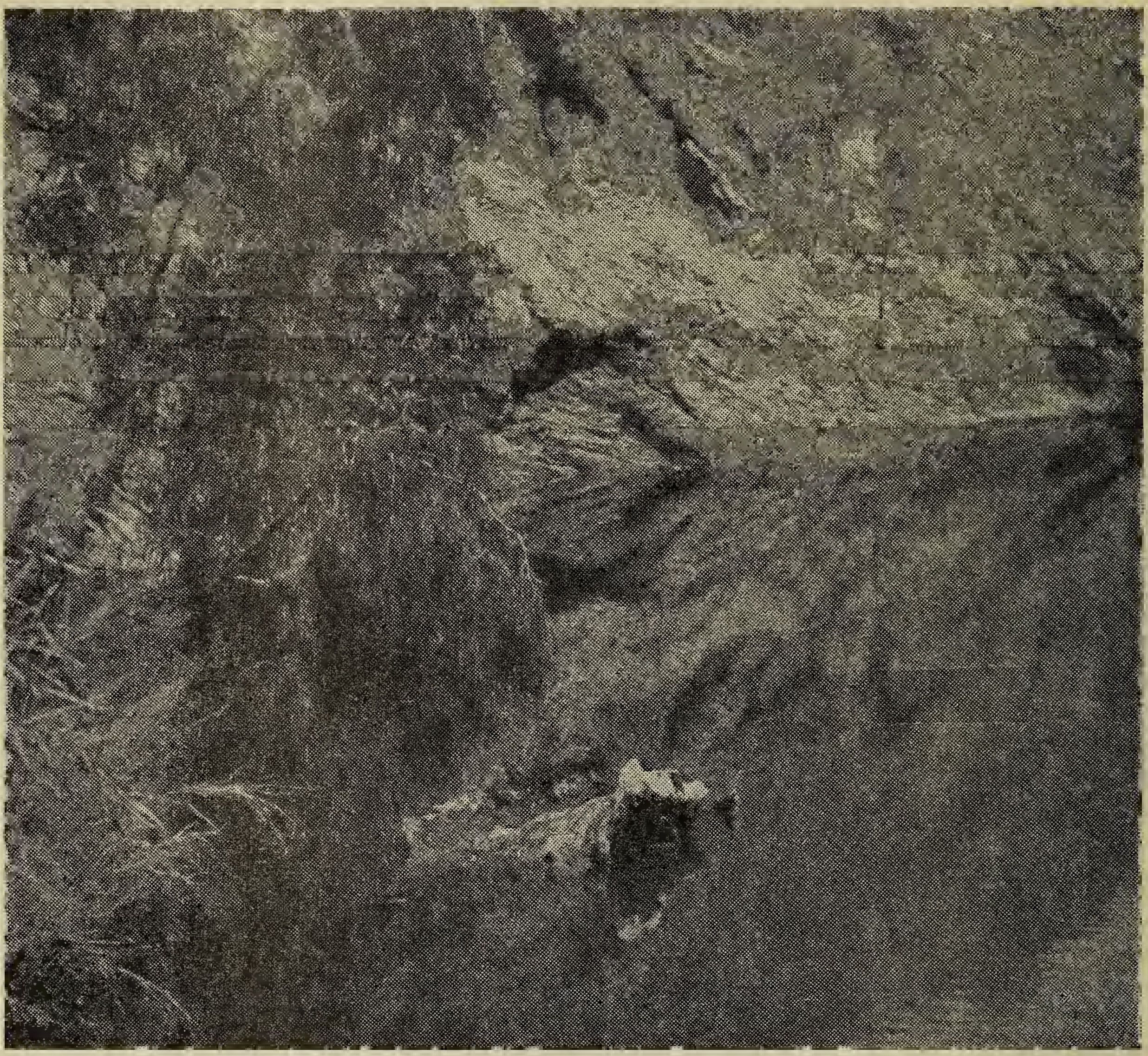
This station is 50 miles east of Derby in low slightly undulating country in which there are many billabongs and small pools, and some swamps and streams. All these had held water since the heavy rain in early January. A fall of 40 points on the night of our arrival restricted our activities and made it difficult to know which waters would normally lie long enough to allow mosquito breeding to take place.

Pools in the creek below the station homestead and extensive billabongs, all with muddy water, provided breeding places for *A. amictus amictus* and *C. annulirostris,* the only other species found was *A. annulipes.* In most of these waters there was a variety of aquatic vegetation and a considerable fauna of aquatic insects.

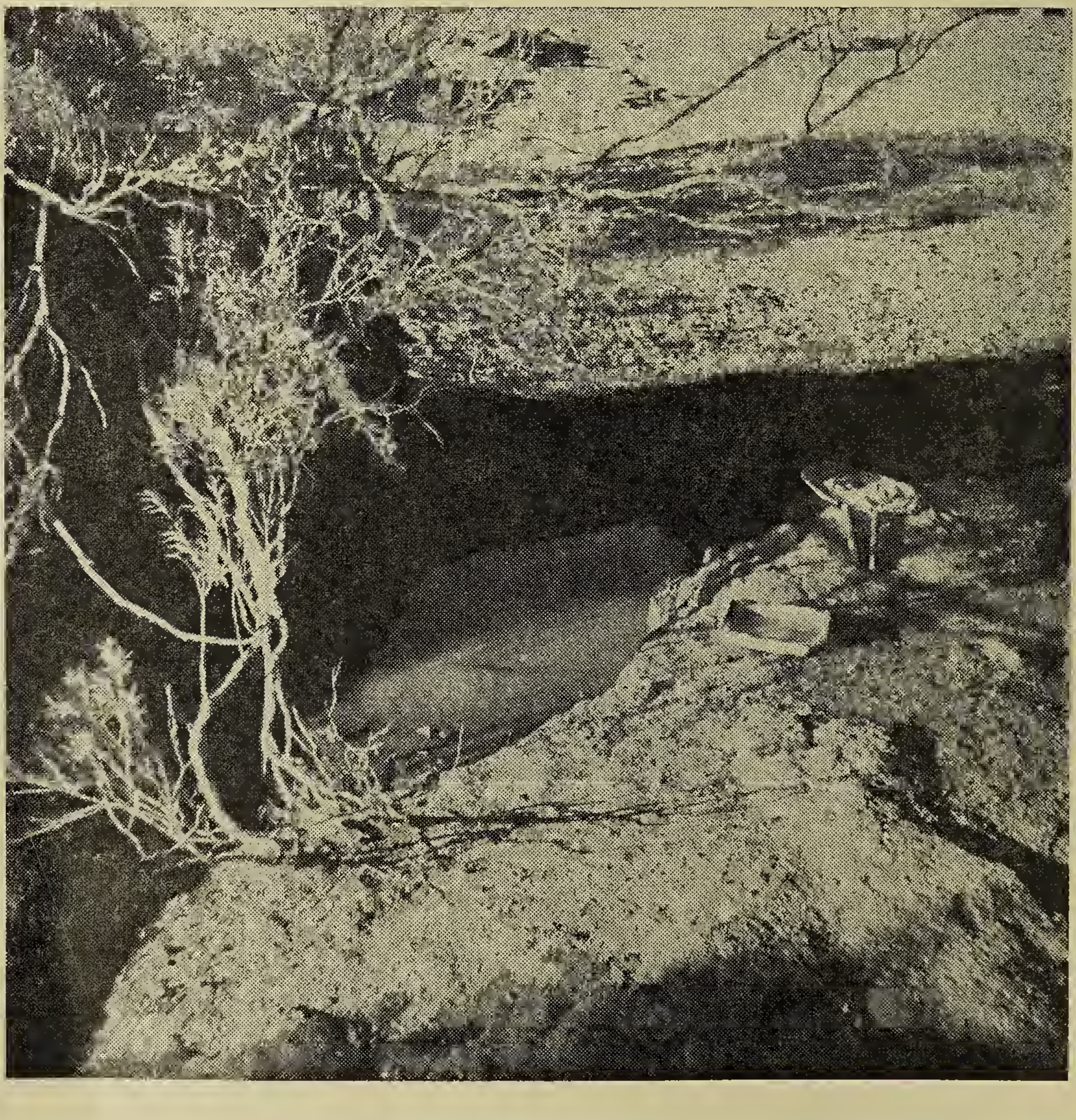
Adults of three species were caught biting in the homestead in the early morning : *A. tremula, A. normanensis* and *C. annulirostris.* These were not very numerous at the time of our visit, but mosquitoes were said to be a nuisance both in the early morning and during the day " after recent rains."

Kalumburu—10th to 16th March.

The mean annual rainfall here is 40 inches, all of it falling in the summer months. At the time of our visit there was abundant water and a great diversity of breeding places, which provided us with by far the most varied mosquito fauna of our survey (16 species). How much of this water persists during the



KIMBERLEY RESEARCH STATION.
Deep pool at foot of cliff, breeding place of *Anopheles annulipes*, *A. novaguinensis*, and *C. crinicauda*.



MILLSTREAM.
Scour pool in river bed, breeding place of *Anopheles annulirostris*, *Aedes pseudonormanensis*, and *Culex pipiens australicus*.

dry season it was difficult to discover ; in addition to the main pool in the King Edward River (a mile or more long), stagnant water remains in many of the streams, but it must be presumed that most of the smaller streams, the seepages, shallow swamps, and rock pools are dry for months.

Four species of mosquito were common : *A. annulipes*, *A. novaguinensis*, *C. annulirostris*, and *C. crinicauda*. The larvae of all four were found in a wide variety of breeding places in which there was clear water ; pools in soil with reeds and aquatic vegetation, rock pools with or without vegetation, the edges of clear running streams, seepages over rocks or sand. Larvae of *A. annulipes*, *C. annulirostris*, and *C. crinicauda* were found in an old oil drum at the Mission, and the two species of *Culex* were found in pools with muddy water.

It was also very noticeable that, despite the abundance of surface water it was only in occasional isolated pools (possibly accumulations from recent rain) that larvae were numerous. There were extensive open pools with clear water among the rocks not far from the mission, the many streams had slack waters at their edges, and in the river gorge (and elsewhere) there was abundant seepage water, but in all of these it was only by careful search that a few larvae could be found. In such places the larvae were confined largely to the mats of aquatic vegetation and to mere films of water oozing over the rocks or sand. Possibly conditions are very different at the beginning of the rainy season before the various predators have had time to multiply.

Two breeding places of *A. bancrofti bancrofti* and one of *A. meraukensis* were found, and a single adult *bancrofti* was caught biting, after prolonged exposure on the river bank at night. No *A. amictus* were found, nor was this species found in a brief visit in August, 1953. There were however none of the muddy pools and swamps of the type in which we found extensive breeding at Kimberley Downs and Kimberley Research Station.

Larvae of *Aedes vigilax* were found in a rock pool just above high tide mark at the old mission site. One or two breeding places were found of several other species, but these call for no special comment here.

Kimberley Research Station—16th to 19th March.

The station is situated on the east bank of the Ord River, the largest river in Western Australia, and one liable to rapid rises and extensive flooding following summer storms. To the west of the river there is a sharp escarpment through which streams have cut small gorges with waterfalls. To the east there is an extensive flood plain with both clay and sandy soil.

Larvae of *A. amictus amictus* and *amictus hilli* were plentiful in the billabongs and other large pools where the water was churned to slime by the cattle ; they were the only species in such places. *C. annulirostris* was also common, it was breeding in immense numbers in the rice bays where jute had been left to ret.

In the clear water of the seepages and pools of the escarpment we found *A. annulipes*, *A. novaguinensis*, and *C. crinicauda* breeding together.

Adult mosquitoes were surprisingly few, considering the large numbers that were breeding in the rice bays ; *C. annulirostris* was the commonest, but *A. novaguinensis* was caught and also the salt-water breeding species *Aedes vigilax*.

Wyndham—19th to 20th March.

An overnight stop was made here but no systematic searches were made. We found *A. amictus amictus* breeding on the aerodrome. Presumably *Ae. vigilax* will breed where following suitable tides and rain, but we saw no breeding places. There were no domestic mosquitoes at the hotel, but in one house we visited a quarter of a mile away they were abundant, thanks to an open underground tank.

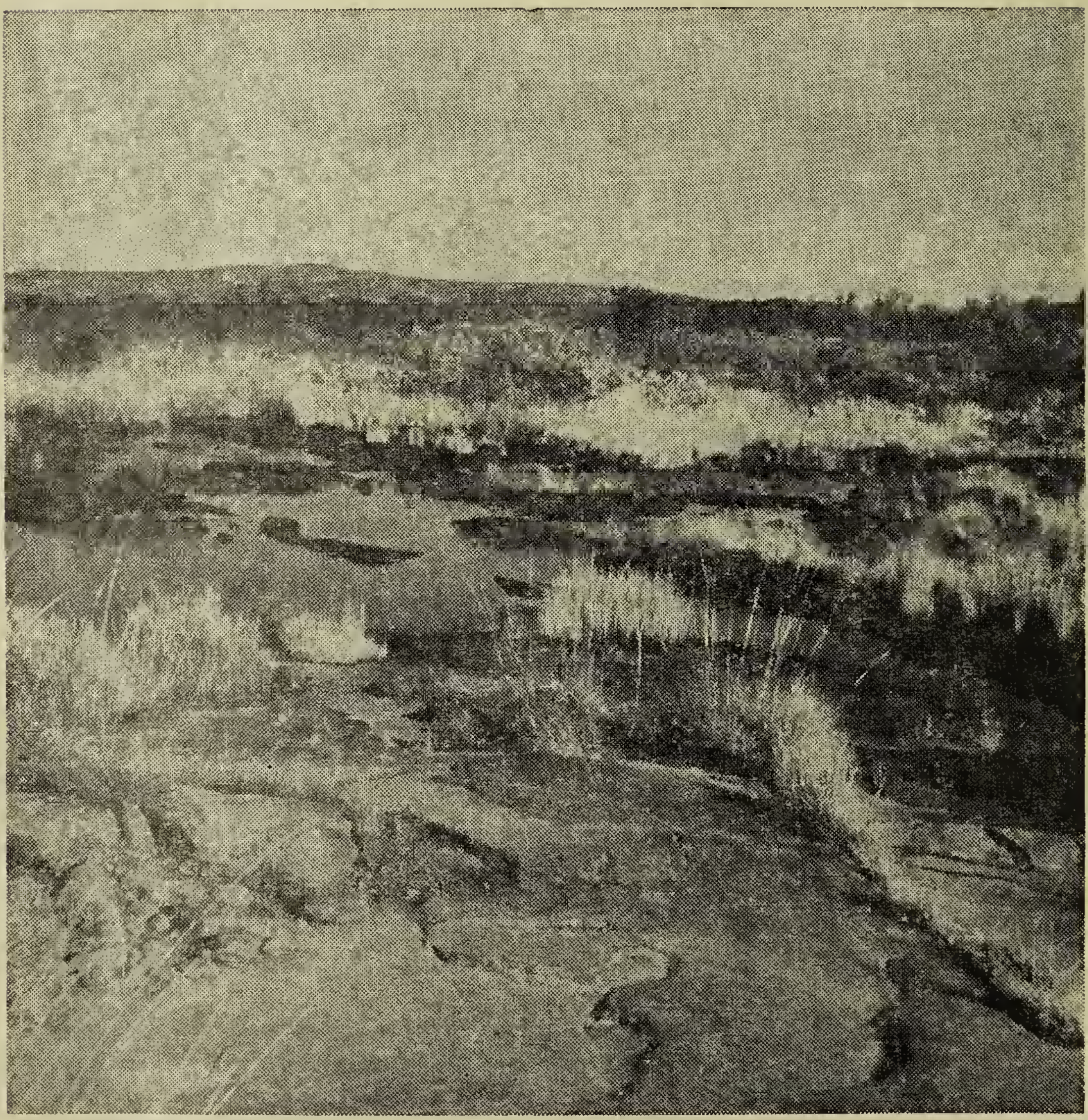
DISCUSSION OF RESULTS.

Conditions during the survey.

The main survey was made during the wet season in the hope of obtaining the greatest number and variety of mosquitoes. In spite of this, adult mosquitoes were nowhere abundant and the few nuisance mosquitoes we encountered were the result of readily preventable domestic breeding. We were repeatedly told that mosquitoes had been very numerous at some time during recent months, particularly shortly after heavy rain. One domestic nuisance mosquito previously recorded from the area, *Tripteroides punctolateralis* (Theo), was not found at all, and four other species which have been recorded from the Kimberley region were not taken.

The present collection cannot therefore claim to be fully representative of the mosquito population, either as an indication of the range of species or of their relative abundance. To obtain an adequate coverage, it would be necessary to make repeated collections throughout the year in a number of places, and this is very desirable. We have asked a number of residents to collect mosquitoes for us, but such collections can only indicate the identity and periodicity of the nuisance mosquitoes. There are many instances of disease-carrying mosquitoes being inconspicuous and even difficult to find.

KALUMBURU.
Shallow fresh water pool near Mission, breeding place of *Culex annulirostris* and *Aedomyia catasticta.*



KALUMBURU.
Extensive shallow pools in rocks near King Edward River; no mosquito breeding found here.

In spite of these limitations, six species and sub-species of anopheles were found and 18 species of culicine mosquito, and much useful information was obtained with regard to the biology and distribution of these mosquitoes. Certain generalisations may be risked in the hope that further observations will confirm or correct them.

Distribution of anopheles mosquitoes.

Of the six species found, *A. annulipes* occurs throughout Western Australia and it was common everywhere we visited, the larvae being taken in a wide variety of waters. The remaining five species were not found outside the Kimberley region, and there are no records of their occurrence further south.

A. amictus amictus was abundant, breeding freely in extensive billabongs and other shallow muddy waters, particularly in flat country (Kimberley Downs and K.R.S.). In our limited experience such waters appear to be its preferred breeding places. We did not find it at Kalumuru where there was very little of this type of water. The larvae of *A. amictus hilli* were found (at K.R.S.) breeding with *A. amictus amictus.*

A. novaguinensis was found only at Kalumburu and Kimberley Research Station. The larvae were in clear water, either in rock pools, in seepages, or at the edges of creeks, and often there was alga or some other aquatic vegetation. In many cases the larvae were confined to places where there was little more than a film of water trickling over a rock face, and as soon as there was as much as half an inch of free water none could be found. Such places are difficult to search and larvae were probably more abundant than our records show, at least at Kalumburu. We did not see waters of this type in the West Kimberley District, which may be the reason for the absence of this species from our collections there.

Single breeding places of *A. bancrofti bancrofti* and *A. maraukensis* were found at Kalumburu.

The transmission of malaria.

In the past there have been sporadic outbreaks of malaria in the Kimberley region. The last epidemic occurred in 1934, since when few cases have been reported and there is no evidence that endemic malaria persists.

On the basis of the views expressed by Ford (1950) we might attribute this freedom from endemic malaria to the absence of *A. punctulatus farauti Laveran.* However, MacKerras (1947) doubts the prime importance of this species and believes that any common species of anopheles will serve as a vector of malaria in northern Australia, if human populations and parasites are presented to them in sufficient numbers.

A. punctulatus farauti was not found in our survey despite prolonged search of likely breeding places ; we know of no record of its having been found in Western Australia and have no reason to implicate it as the vector of previous epidemics.

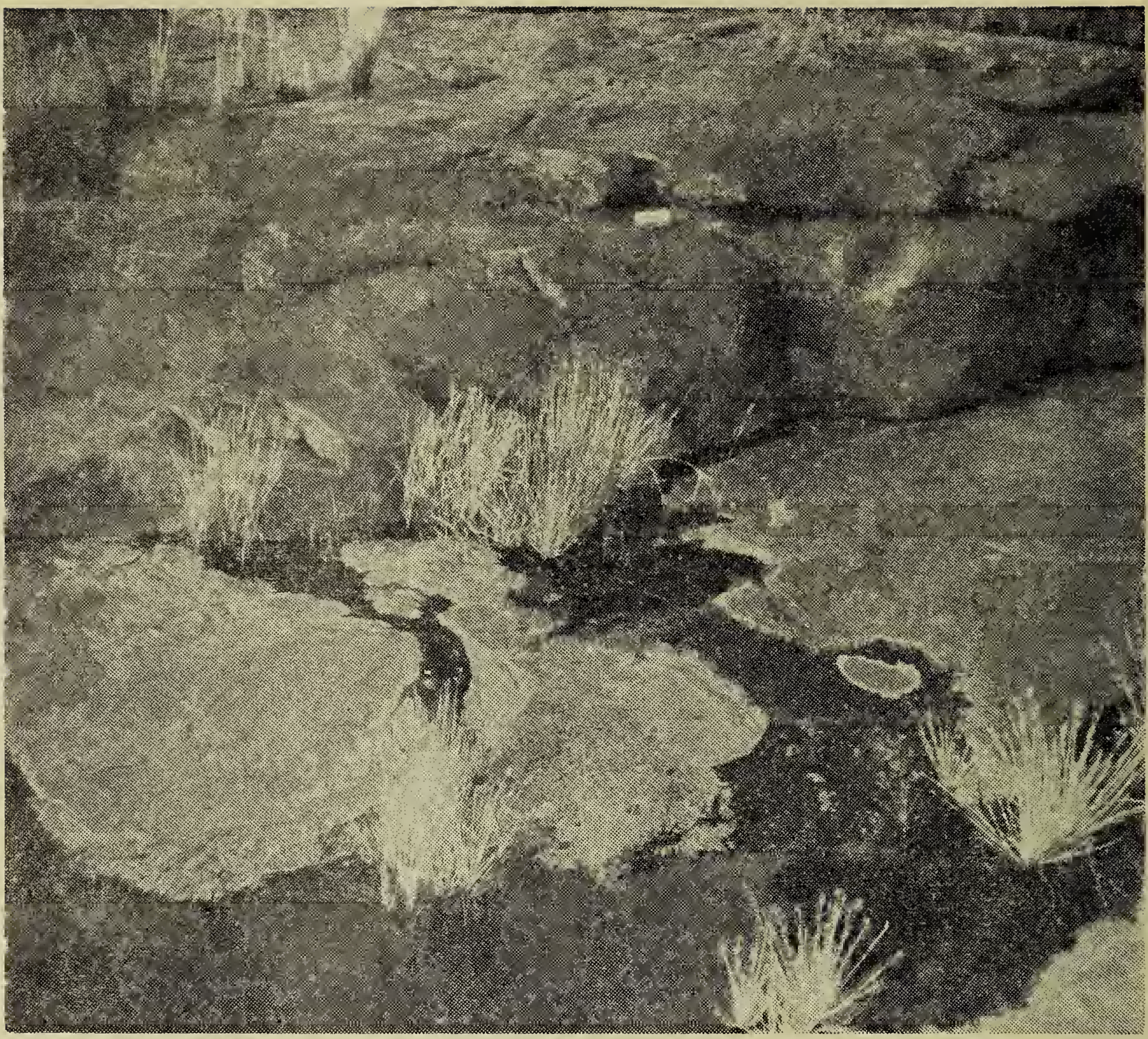
Mackerras (1947) attributes the transmission of malaria in outbreaks in north Queensland to *A. annulipes,* on the basis of epidemiological observations. This species is abundant everywhere in Western Australia, but it does not appear to bite man readily. This lack of an anthropophilic habit seems the most probable reason why *A. annulipes* is not normally a vector. The larvae of *A. amictus amictus* and *A. novaguinensis* were also abundant at certain places in our survey. Lee and Woodhill (1944) state that both species feed readily on man and that *A. novaguinensis* enters houses to feed (we caught this species biting once, but did not catch *A. amictus amictus*). There is, however, no evidence that either species is persistently man-biting in habit, as are the efficient vectors of malaria.

It appears to us that the relative freedom from endemic malaria is attributable primarily to the absence of an efficient vector species of anopheles, though other factors must be responsible for the recent further recession. The epidemics have probably resulted from the great abundance of the indigenous anopheles mosquitoes following abnormal conditions, heavy rains and flooding, either in the presence of endemic malaria or with the arrival of gametocyte carriers. In the absence of any parasitological evidence as to the identity of the vector species, it seems fruitless for us to speculate further.

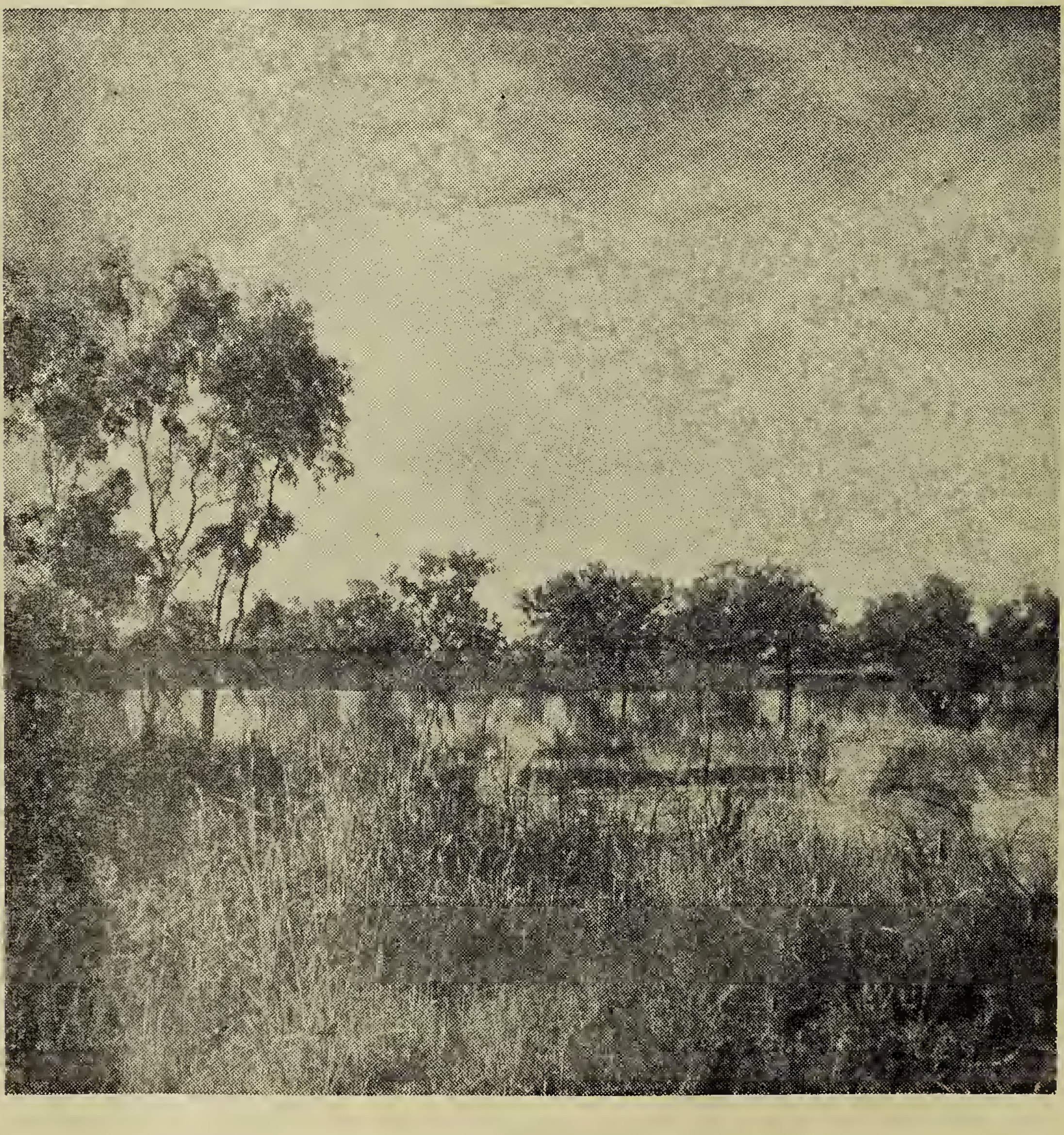
It is our opinion, therefore, that for continued freedom from malaria, tropical Western Australia depends on :—

1. The exclusion of efficient exotic vectors (*A. punctulatus punctulatus* of New Guinea, *A. gambiae* of Africa, or one of the Malayan species). This is primarily dependent on proper control of international aircraft at all ports. The eradication of an introduced species once established, would be very difficult and could be costly.
2. The exclusion of human gametocyte carriers from places where heavy rains or flooding have caused the indigenous species of anopheles to be particularly plentiful.
3. The exclusion of *A. punctulatus farauti* from the north-western part of the Kimberley region, an area that would seem to be eminently suitable for this species because of the high rainfall. The possibility of its importation should be watched in relation to the future development of the area.

In the event of an outbreak of malaria, it is most important that immediate steps be taken to identify the vector species.



KALUMBURU.
Seepage over rocks, breeding place of *Anopheles novaguinensis; Anopheles annulipes, Culex annulirostris,* and *C. crinicauda* found in similar places.



KIMBERLEY DOWNS STATION.
Billabong with shallow muddy water, breeding place of *Anopheles amictus amictus, Anopheles annulipes* and *Culex annulirostris.*

Culicine Mosquitoes.

Culex annulirostris was much the commonest culicine mosquito in our collections. It was as plentiful at Millstream in winter as elsewhere in summer. We found it breeding freely in a wide variety of natural waters, clear, silt-laden, and polluted. At K.R.S. there was intense breeding in rice bays in which jute had been left to ret. Adults were caught biting on a number of occasions.

Aedes tremula was the principal domestic nuisance mosquito in February and March. We found many larvae in rain water tanks, both above and below ground, and once in a rock hole in the river at Roebourne. It is a common tree-hole breeder in north-eastern Australia. In habits this mosquito is as regular and as effective as an alarm clock ; it appears with the first light and for the next hour dances above the head of anyone attempting to sleep. These dances appear to be mating swarms, because they contain more males than females and bites are relatively few. It probably does not normally fly far from its breeding places ; at Roebourne we were not troubled by *tremula* in the hotel despite heavy breeding in the tanks at the hospital a quarter of a mile away (where adults were also caught).

The other common nuisance mosquitoes were singularly scarce during our visit. *Cule atigans* was only taken three times, *Aedes aegypti* once and *Aedes notoscriptus* twice. *Tripteroides punctolateralis* was not found, although it does at times constitute a nuisance in the Kimberley region and breeds in domestic containers. Of the brackish-water breeders, we only found larvae of *Cule sitiens* in one place at Roebourne (and a single larva at Kalumburu), and the larvae of *Aedes vigilax* once, at Kalumburu, and a single adult at K.R.S.

Culex crinicauda was breeding commonly at both Kalumburu and K.R.S., elsewhere it was only found at Wittenoom Gorge. The breeding of this species does not appear to have been recorded previously ; the larvae will be described elsewhere. The larvae were found, together with *C. annulirostris, A. annulipes* and *A. novaguinensis,* in the clear waters of pools, creeks, and seepages, usually with grass or algae and sometimes heavily overgrown. Larvae were also found in an old oil drum at Kalumburu.

The adults only of *Aedes normanensis* were caught in March, at Kimberley Downs and Kalumburu. In June at Millstream, larvae of *Aedes pseudonormanendis* were found in scour pools only, where the water lies for a few weeks. At Millstream also, *C. bitaeniorhynchus* was fairly common and entered the house to bite and rest. *C. pipiens australicus* larvae were common here also, but no adults were caught.

The occurrence of two closely related species of *Aedes* (Finlaya) breeding in a hole in the fork of a baobab tree at Kalumburu, is of some biological interest. One of these, *Ae. purpureus,* was preying on the other species, which is as yet undescribed. Predatism does not seem to have been noted in the subgenus *Aedes Finlaya.* There must presumably have been other such rot holes, but we were unable to locate them. The other species of mosquito found were taken in small numbers only and do not call for comment here.

In conclusion, we wish to stress the need for further collections, made throughout the year, and at other places besides those visited by us. Only if this is done will it be possible to make a true appraisal of the distribution and habits of the mosquitoes of northern Western Australia. In particular, we are completely ignorant of the identity of the nuisance mosquitoes, other than domestic species, and of where and how they survive the long, almost waterless, dry seasons.

ACKNOWLEDGMENTS.

We wish to express our grateful thanks to many kindly persons who helped us on numerous occasions during our travels, and expecially to our generous hosts and hostesses at the stations and missions where we were made welcome. One of us (E.P.H.) was in receipt of a University Research Grant ; he wishes also to acknowledge the facilities offered to him by the Commissioner of Public Health which made it possible for him to visit the North.

APPENDIX.

Sandflies.

These small insects are often extremely plentiful and distressingly persistent in their attacks, in mangrove swamps or in their immediate vicinity, on the beaches, and sometimes further inland. We were able to collect some at Roebourne and at Kalumburu. Provisional identifications of them have kindly been made by Dr. D. J. Lee of the School of Public Health and Tropical Medicine, Sydney ; these are as follows—

Roebourne, 27–2–54.—Caught biting at edge of mangrove swamp, Port Samson, *Culicoides ornatus* Tayl.

Roebourne, 28–2–54.—Collected on beach, Port Samson and Cossack, *Styloconops australiensis* Lee.

Kalumburu, 11–3–54.—Biting near Mission, *Lasiohelea sp.* (some Simuliids were caught biting here, but could not be identified).

Kalumburu, 12–3–54.—Caught biting near head of small stream, *Leptoconops stygius* Sk.

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EXPLANATORY NOTE.

Although the project reported upon here was planned and initiated during the year 1953, it was not completed until well into 1954. For convenience, however, it is being recorded in this Annual Report for 1953.

Table 1.

RAINFALL—Figures in " points " (0·01 inch).

	Roebourne.			Millstream.		Derby.			Kimberley Downs.		Kalumburu.			K.R.S.	
	1953	Wet Days	56-year Mean	1953	Wet Days	1953	Wet Days	57-year Mean	1953	Wet Days	1953	Wet Days	32-year Mean	1953	Wet Days
January	18	1	214	101	4	634	13	746	338	12	1255	18	969	817	11
February	....	....	199	....	....	75	1	562	25	1	401	11	857	712	7
March	5	2	291	80	3	96	7	443	98	3	950	13	742	233	6
April	4	1	138	113	3	166	4	140	....	....	218	10	167	99	5
May	241	5	114	148	5	39	1	75	....	....	....	....	39	....	....
June	124	3	102	155	4	....	....	53	....	....	....	....	36	....	....
July	11	1	56	9	2	....	....	23	....	....	....	....	9	....	....
August	28	3	24	....	....	....	....	9	....	....	....	....	....	....	....
September	3	3	7	....	....	....	....	1	....	....	....	....	15	4	3
October	....	....	3	....	....	....	....	6	....	....	9	1	52	13	2
November	....	....	7	....	....	2	1	83	107	2	431	5	260	151	10
December	....	....	38	59	3	129	8	404	155	4	713	13	518	306	9
			1,193					2,545					3,664		
1954															
January	454	5	....	422	5	940	10	....	1023	10	1035	23	....	815	14
February	48	2	....	22	1	184	6	....	250	4	533	12	....	280	6

Table II.

DISTRIBUTION OF MOSQUITOES FOUND IN THE SURVEY.

* Larvae or adults present. ** Larvae abundant. † Larval identifications requiring confirmation from adults.

	Roebourne.	Millstream Station	Wittenoom Gorge	Derby	Kimberley Downs Station	Kalumburu	Kimberley Research Station
Anopheles—							
amictus amictus Edwards	....	....	....	*	**	....	**
amictus hilli Woodhill, and Lee	....	....	....	....	....	....	*
annulipes Walker	**	**	*	**	*	**	**
bancrofti bancrofti Giles	....	....	....	....	....	*	....
meraukensis Venhuis	....	....	....	....	....	*	....
meraukensis Venhuis	....	....	....	....	....	**	**
Aedomyia—							
catasticta Knab	....	....	....	....	....	*	....
Aedes—							
(*Ochlerotatus*) *normanensis* Taylor	....	*	....	....	*	*	....
(*Ochlerotatus*) *vigilax* (Skuse)	....	....	....	....	....	*	*
(*Finlaya*) *notoscriptus* (Skuse)	....	....	....	....	*	....	....
(*Finlaya*) *purpureus* (Theobald)	....	....	....	*	....	*	....
(*Finlaya*) *n.sp.*	....	....	....	....	....	*	....
(*Macleaya*) *tremula* (Theobald)	**	....	....	*	*	*	....
(*Stregomyia*) *aegypti* (Linnaeus)	....	....	....	*	....	....	....
Culex—							
(*Lophoceratomyia*) *fraudatrix* Theobald †	....	*	....	....	....	*	....
(*Culex*) *annulirostris* Skuse	**	**	....	**	**	**	**
(*Culex*) *fasicinctus* Edwards	....	....	*	....	....	*	*
(*Culex*) *bitaeniorhynchus* Giles	....	*	....	....	....	....	....
(*Culex*) *crinicauda* Edwards	....	....	*	....	....	**	**
(*Culex*) *fatigans* Weidemann	*	....	....	*	....	....	....
(*Culex*) *pipiens australicus* Dobrowortsky & Drummond	....	**	....	....	....	....	....
(*Culex*) *sitiens* Wiedemann	*	....	....	....	....	*	....
(*Culex*) *squamosus* Taylor †	....	....	....	....	....	*	....
(*Culex*) *tritaeniorhynchus siamensis* Barraud †	....	....	....	....	....	....	*

(Achlerotatus) Pseud—Normaueusis (Marks).

APPENDIX XXIV.

DESICCATED COCONUT—BACTERIOLOGICAL FINDINGS.

WESTERN AUSTRALIA.

August-September, 1953.

Serial No.	Sample No.	Date Collected.	Country of Origin.	Source. W = Wholesaler. R = Retailer.	Brand.	Stencil.	Packing Slip (Date).	Opened or Unopened Carton.	Laboratory Finding.
				1st SERIES.					
1	101	5-8-53	Ceylon	Parsons Bros. (W)	?	?	?	Unopened	....
2	102	,,	Papua	,, ,,	Tropic Snow	?	?	,,	....
3	103	,,	Ceylon	Sara & Cook (W)	?	?	?	,,	....
4	104	,,	Papua	,, ,,	Tropic Snow	?	?	,,	....
5	105	,,	,,	National Trading Co. (W)	,,	D.3X	?	Opened	S. Senftenberg
6	106	,,	Ceylon	,, ,, ,,	?	?	?	?	....
7	107	,,	Papua	Bairds Ltd. (W)	Tropic Snow	?	?	Opened	....
8	108	,,	Ceylon	,, ,,	?	?	?	,,	....
9	109	,,	Papua	Farnham Bros. (R)	Tropic Snow	?	?	?	....
10	110	,,	,,	Mauri Bros. & Thompson (W)	,,	?	?	Unopened	....
11	111	,,	Ceylon	Howson (R)	?	?	?	Opened	....
12	112	,,	,,	Mauri Bros. & Thompson (W)	?	?	?	Unopened	....
13	113	,,	,,	Plaistowes, Ltd. (W)	?	?	?	,,	....
14	114	,,	,,	,, ,,	?	?	?	,,	....
15	115	,,	Papua	,, ,,	Tropic Snow	E.3X	?	Opened	S. Senftenberg
16	116	,,	,,	Co-op. Wholesale Store (W)	,,	D.3X	20-4-53	Unopened	,,
17	117	,,	Ceylon	Duncan Preston (W)	?	?	?	,,	....
18	118	,,	Papua	,, ,,	Tropic Snow	D.3X	?	,,	S. Senftenberg
				2nd SERIES.					
1	119	6-8-53	Papua	Duncan Preston (W)	Tropic Snow	?	?	Unopened	....
2	120	,,	,,	,, ,,	,,	?	?	,,	....
3	121	,,	,,	,, ,,	,,	?	?	,,	....
4	122	,,	,,	,, ,,	,,	?	?	,,	....
5	123	,,	,,	,, ,,	,,	?	?	,,	....
6	124	,,	,,	,, ,,	,,	?	?	,,	....
7	125	,,	,,	Bairds Co. (W)	,,	?	?	,,	....
8	126	,,	,,	,, ,,	,,	?	?	,,	....
9	127	,,	,,	Mauri Bros. & Thompson (W)	,,	?	?	,,	....
10	128	,,	,,	,, ,, ,, ,,	,,	?	?	,,	....
11	129	,,	,,	,, ,, ,, ,,	,,	?	?	,,	....
12	130	,,	,,	,, ,, ,, ,,	,,	?	?	,,	....
13	131	,,	,,	,, ,, ,, ,,	,,	?	?	,,	....
14	132	,,	,,	Sara & Cook (W)	,,	?	?	,,	....
15	133	,,	,,	,, ,,	,,	?	?	,,	....
16	134	,,	,,	,, ,,	,,	?	?	,,	....
17	135	,,	,,	,, ,,	,,	?	?	,,	....
18	136	,,	,,	,, ,,	,,	?	?	,,	....
19	137	,,	,,	,, ,,	,,	?	?	,,	....
20	138	,,	,,	,, ,,	,,	?	?	,,	....
21	139	,,	,,	,, ,,	,,	?	?	,,	....
22	140	,,	,,	Parson Bros. (W)	,,	?	?	,,	....
23	141	,,	,,	,, ,,	,,	?	?	,,	....
24	142	,,	,,	,, ,,	,,	?	?	,,	....
25	143	,,	,,	,, ,,	,,	?	?	,,	....
26	144	,,	,,	,, ,,	,,	?	?	,,	....
27	145	,,	,,	,, ,,	,,	?	?	,,	....
28	146	,,	,,	,, ,,	,,	?	?	,,	....
29	147	,,	,,	,, ,,	,,	?	?	,,	....
30	148	,,	,,	,, ,,	,,	?	?	,,	....
31	149	,,	,,	,, ,,	,,	?	?	,,	....
32	150	,,	,,	,, ,,	,,	?	?	,,	....
33	151	,,	,,	,, ,,	,,	?	?	,,	....
34	152	,,	,,	,, ,,	,,	?	?	,,	....
35	153	,,	,,	,, ,,	,,	?	?	,,	....
36	154	,,	,,	,, ,,	,,	?	?	,,	....
37	155	,,	,,	,, ,,	,,	?	?	,,	....
38	156	,,	,,	Co-op. Wholesale Service (W)	,,	?	?	,,	....
39	157	,,	,,	,, ,, ,, ,,	,,	?	?	,,	....
40	158	,,	,,	Plaistowes, Ltd. (W)	,,	?	?	,,	....
41	159	,,	,,	,, ,,	,,	?	24-4-53?	,,	S. Nyborg
42	160	,,	,,	National Trading Co. (W)	,,	?	?	,,	....
43	161	,,	,,	,, ,, ,, ,,	,,	?	?	,,	....
44	162	,,	,,	Farnham Bros. (R)	,,	?	?	,,	....
45	163	,,	,,	,, ,,	,,	?	?	,,	....
46	164	,,	,,	,, ,,	,,	?	?	,,	....
47	165	,,	,,	,, ,,	,,	?	?	,,	....
48	166	,,	,,	Fowler Ltd., D. J. (W)	,,	?	?	,,	....
				3rd SERIES.					
1	173	13-8-53	Papua	Farnham Bros. (R)	Tropic Snow	A.3	?	Unopened	....
2	174	,,	,,	,, ,,	,,	,,	5-1-53	,,	S. Senftenberg
3	175	,,	,,	,, ,,	,,	,,	?	,,	....
4	176	,,	,,	,, ,,	,,	,,	?	,,	....
5	177	,,	,,	Plaistowes, Ltd. (W)	,,	E.3X	?	,,	....
6	178	,,	,,	,, ,,	,,	D.3X	?	,,	....
7	179	,,	,,	,, ,,	,,	,,	7-4-53	,,	S. Senftenberg
8	180	,,	,,	,, ,,	,,	,,	?	,,	....
9	181	,,	,,	,, ,,	,,	E.3X	?	,,	....
10	182	,,	,,	Co-operative W.S. (W)	,,	D.3X	?	,,	....
11	183	,,	,,	,, ,, ,,	,,	,,	?	,,	....
12	184	,,	,,	National Trading Co. (W)	,,	,,	?	,,	....
13	185	,,	,,	,, ,, ,, ,,	,,	,,	?	,,	....
14	186	,,	,,	Sara & Cook	,,	A.3	?	,,	....
15	187	,,	,,	,, ,,	,,	,,	?	,,	....
16	188	,,	,,	,, ,,	,,	,,	13-1-53	,,	S. Senftenberg
17	189	,,	,,	,, ,,	,,	,,	21-1-53	,,	,,
18	190	,,	,,	,, ,,	,,	C.2	?	,,	....
19	191	,,	,,	,, ,,	,,	A.3	?	,,	....
20	192	,,	,,	,, ,,	,,	,,	?	,,	....
21	193	,,	,,	,, ,,	,,	,,	?	,,	....

Appendix XXIV—*continued.*

Serial No.	Sample No.	Date Collected.	Country of Origin.	Source. W = Wholesaler. R = Retailer.	Brand.	Stencil.	Packing Slip (Date).	Opened or Unopened Carton.	Laboratory Finding.
3rd SERIES—*continued.*									
22	194	14–8–53	Papua	Duncan Preston (W)	Tropic Snow	D.3X	?	Unopened	....
23	195	,,	,,	,, ,,	,,	,,	?	,,	....
24	196	,,	,,	,, ,,	,,	,,	?	,,	....
25	197	,,	,,	,, ,,	,,	,,	?	,,	....
26	198	,,	,,	,, ,,	,,	C.3X	?–4–53	,,	S. Senftenberg
27	199	,,	,,	,, ,,	,,	E.3X	12–4–53	,,	,,
28	200	,,	,,	,, ,,	,,	,,	?	,,	....
29	201	,,	,,	Parsons Bros. (W)	,,	A.3	?	,,	....
30	202	,,	,,	,, ,,	,,	C.2	13–12–52	,,	S. Senftenberg
31	203	,,	,,	,, ,,	,,	A3.	?	,,	....
32	204	,,	,,	,, ,,	,,	,,	?	,,	....
33	205	,,	,,	,, ,,	,,	,,	9–1–53	,,	S. Senftenberg
34	206	,,	,,	,, ,,	,,	,,	22–4–53	,,	,,
35	207	,,	,,	,, ,,	,,	,,	?	,,	....
36	208	,,	,,	,, ,,	,,	,,	14–1–53	,,	S. Senftenberg
37	209	,,	,,	,, ,,	,,	,,	?	,,	....
38	210	,,	,,	,, ,,	,,	D.3X	?	,,	....
39	211	,,	,,	,, ,,	,,	,,	?	,,	....
40	212	,,	,,	,, ,,	,,	,,	?	,,	....
41	213	,,	,,	,, ,,	,,	,,	9–4–53	,,	S. Senftenberg
42	214	,,	,,	,, ,,	,,	,,	?	,,	....
43	215	,,	,,	,, ,,	,,	,,	24–4–53	,,	S. Senftenberg
44	216	,,	,,	,, ,,	,,	,,	?	,,	....
45	217	,,	,,	Maurie Bros. & Thompson (W)	,,	A.3	?	,,	....
46	218	,,	,,	,, ,, ,, ,,	,,	,,	9–1–53	,,	S. Senftenberg
47	219	,,	,,	,, ,, ,, ,,	,,	D.3X	?	,,	....
48	220	,,	,,	,, ,, ,, ,,	,,	E.3X	?	,,	....
49	221	,,	,,	Bairds Co. (R)	,,	?	?	Opened	S. Senftenberg
50	222	,,	,,	Maurie Bros. & Thompson (W)	,,	E.3X	15–5–53	Unopened	S. Senftenberg
51	223	,,	,,	Bairds Co. (R)	,,	D.3X	?	,,	....
52	224	,,	,,	,, ,,	,,	,,	13–4–53	,,	S. Senftenberg
4th SERIES.									
1	233	15–9–53	Papua	Duncan Preston (W)	Tropic Snow	C.3X	30–3–53	Unopened	....
2	234	,,	,,	,, ,,	,,	,,	31–3–53	,,	S. Senftenberg
3	235	,,	,,	,, ,,	,,	,,	30–3–53	,,	,,
4	236	,,	,,	,, ,,	,,	,,	13–3–53	,,	....
5	237	,,	,,	,, ,,	,,	,,	10–3–53	,,	....
6	238	,,	,,	,, ,,	,,	,,	13–3–53	,,	....
7	239	,,	,,	,, ,,	,,	,,	31–3–53	,,	....
8	240	,,	,,	Co-operative W.S. (W)	,,	,,	30–3–53	,,	S. Senftenberg
9	241	,,	,,	,, ,, ,,	,,	,,	5–3–53	,,	,,
10	242	,,	,,	Sara & Cook (W)	,,	,,	30–3–53	,,	,,
11	243	,,	,,	,, ,,	,,	,,	,,	,,	,,
12	244	,,	,,	Perth Road Board	,,	,,	?	,,	,,
13	245	,,	,,	,, ,, ,,	,,	,,	?	,,	....
14	246	,,	,,	,, ,, ,,	,,	,,	10–3–53	,,	S. Senftenberg
15	247	,,	,,	Bassendean Road Board	,,	,,	?	,,	....
16	248	,,	,,	Fremantle Municipality	,,	,,	31–3–53	,,	S. Senftenberg
17	249	,,	,,	,, ,,	,,	,,	30–3–53	,,	....
18	250	,,	,,	,, ,,	,,	,,	31–3–53	,,	....
19	251	,,	,,	,, ,,	,,	,,	,,	,,	....
20	252	,,	,,	,, ,,	,,	,,	,,	,,	....
21	253	,,	,,	,, ,,	,,	,,	30–3–53	,,	....
22	254	,,	,,	,, ,,	,,	,,	,,	,,	....
23	255	,,	,,	,, ,,	,,	,,	?	,,	....
24	256	,,	,,	,, ,,	,,	,,	31–3–53	,,	....
25	257	,,	,,	,, ,,	,,	,,	30–3–53	,,	....
26	258	,,	,,	,, ,,	,,	,,	31–3–53	,,	....
27	259	,,	,,	,, ,,	,,	,,	30–3–53	,,	....
28	260	,,	,,	,, ,,	,,	,,	,,	,,	....

1st SERIES. 18 Samples (9 Papuan ; "Tropic Snow" ; 9 Ceylonese) 4 Papuan Positive—(All S. Senftenberg).
2nd SERIES. 48 Samples (All Papuan "Tropic Snow" ; taken from unopened cartons).—1 positive (S. Nyborg).
3rd SERIES. 52 Samples (All Papuan "Tropic Snow" ; all but one from unopened cartons.)—16 positive (All S. Senftenberg).
4th SERIES. 28 Samples (All Papuan "Tropic Snow") ; all unopened cartons of C.3X—9 positive (All S. Senftenberg).
TOTAL :—146 Samples ; 30 positive (29 S. Senftenberg, 1 S. Nyborg).

APPENDIX XXV.

VITAL STATISTICS.

WESTERN AUSTRALIA.

——	1951.	1952.	1953.
Mean Population—			
Males	299,024	310,441	321,024
Females	282,435	291,585	301,673
Total	581,459	602,026	622,697
Births—			
Males	7,684	7,826	8,056
Females	7,110	7,587	7,806
Total	14,794	15,413	15,862
Birth rate per 1,000 of mean population	25·44	25·60	25·47
Deaths—			
Males	3,086	3,077	3,008
Females	2,202	2,132	2,064
Total	5,288	5,209	5,072
Death rate—rate per 1,000 of mean popultion	9·09	8·65	8·15
Natural increase rate per 1,000 of mean population	16·35	16·95	17·32
Infant Mortality per 1,000* births—			
Metropolitan area	26·38	23·52	23·28
Rest of State	30·84	27·69	24·36
Whole State	28·73	24·91	23·83
Stillbirths—			
Metropolitan area	144	125	135
Whole State	297	283	268

* Excluding Stillbirths.

Comparison of Infant Mortality and General Death Rate.

Place.	Infant Mortality.			General Death Rate.		
	1951.	1952.	1953.	1951.	1952.	1953.
New Zealand (*a*)	22·77	21·62	20·06	9·56	9·28	8·84
Western Australia	28·73	24·91	23·83	9·09	8·65	8·15
New South Wales	26·29	24·50	24·64	9·62	9·45	9·20
Victoria	22·61	22·29	21·15	10·33	9·99	9·50
Queensland	25·66	24·94	24·98	9·20	9·05	8·72
Tasmania	26·64	21·73	22·88	8·76	8·48	8·15
South Australia	24·51	23·09	20·65	9·98	9·53	9·19

(*a*) Non Maori.

Appendix XXVI.

INCIDENCE AND MORTALITY OF NOTIFIABLE INFECTIOUS DISEASES.

Diseases Notifiable.	1950.		1951.		1952.			1953.		
	Cases Re-ported.	Deaths.	Cases Re-ported.	Deaths.	Cases Re-ported.	Amended Diag-nosis.	Deaths.	Cases Re-ported.	Amended Diag-nosis.	Deaths.
Acute Rheumatism	....	....	8	....	9	9	....	24	24	(C) 4
Amoebiasis	14	....	5	....	5	5	....	....	....	....
Ankylostomiasis	132	....	13	....	8	8	....	2	2	....
Brucellosis	7	....	8	....	6	6	....	7	7	....
Chorea	....	....	....	....	3	3	....	6	6	1
Dengue Fever	1	....	....	....	....	....	....	1	1	....
Diphtheria	172	7	271	11	156	124	2	195	170	1
Dysentery (Amoebic)	5	....	2	....	6	6	....	6	6	....
Dysentery (Bacillary)	45	1	56	1	72	72	(B) 1	42	42	....
Encephalitis Lethargic	1	....	....	....	....	....	....	3	3	....
Encephalitis Virus	5	2	....	....	....	....	....	....	....	....
Erythoma Nodosum	....	....	....	....	....	....	....	2	2	....
Hydatid	....	....	1	....	....	....	....	....	....	....
Infantile Diarrhoea	4	*26	46	*30	15	15	(A) 17	4	4	8
Infective Hepatitis	36	4	467	3	654	654	9	443	443	1
Lead Poisoning	....	....	....	....	4	4	....	5	5	1
Leprosy	60	....	48	3	37	37	....	26	26	1
Malaria	15	1	7	....	13	13	....	25	25	....
Meningococcal Infection	24	5	20	3	35	35	4	25	25	6
Paratyphoid	....	....	3	....	3	3	1	1	1	....
Poliomyelitis	57	5	94	4	42	37	2	49	44	3
Pleural Effusion	....	....	....	....	21	20	....	9	8	....
Puerperal Fever	2	....	4	....	3	3	....	3	3	....
Purulent Ophthalmia	14	....	23	....	58	58	....	163	163	....
Rubella	45	....	137	....	147	147	....	1,053	1,053	....
Salmonella Infection	6	....	16	....	22	22	....	17	17	....
Scarlet Fever	198	....	179	....	128	125	....	94	93	....
Tetanus	11	6	12	4	13	13	6	12	12	6
Trachoma	....	....	....	....	1	1	....	1,201	1,201	....
P.T.B.	586	125	467	73	524	488	75	376	370	43
Other T.B.	18	3	37	10	50	49	7	34	33	3
Typhoid Fever	7	1	11	....	6	6	1	7	7	....
Typhus Fever	32	....	24	1	25	25	1	18	18	....

Deaths exclude full-blood Aboriginals. * Under two years of age.

1952—

(A) Gastro-Enteritis and Colitis (except ulceration) under two years.

(B) Also one death from other or Unspecified Dysentery.

1953—

(C) Rheumatic Fever.

Appendix XXVII.

NOTIFICATION OF EACH TYPE OF INFECTIOUS DISEASE RECEIVED BY THE COMMISSIONER OF PUBLIC HEALTH FOR EACH WEEK OF THE YEAR ENDED 31st DECEMBER, 1953.

Week of Year.	Acute Rheumatism.	Ankylostomiasis.	Brucellosis.	Chorea.	Dengue.	Diphtheria.	Dysentery (Amoebic).	Dysentery (Bacillary).	Encephalitis Lethargic.	Erythema Nodosum.	Infantile Diarrhoea.	Infective Hepatitis.	Lead Poisoning.	Leprosy.	Malaria.	Meningococcal Infection.	Paratyphoid.	Pleural Effusion.	Poliomyelitis.	Puerperal Fever.	Purulent Ophthalmia.	Rubella.	Salmonella Infection.	Scarlet Fever.	Trachoma.	Tetanus.	P.T.B.	Other T.B.	Typhoid Fever.	Typhus Fever.
1	....	....	....	....	....	5	....	1	....	....	....	16	....	1	....	....	....	....	....	....	1	4	....	2	....	....	8	....	....	....
2	....	....	....	1	....	1	1	1	....	....	....	25	....	....	....	....	....	....	....	....	....	1	1	3	....	....	12	....	....	1
3	....	1	....	....	....	1	....	....	....	....	....	9	....	....	....	....	....	....	1	....	....	2	....	....	....	....	3	....	....	....
4	....	....	1	1	....	5	1	....	....	....	1	10	....	....	....	....	....	....	1	....	....	1	....	6	....	....	6	....	....	1
5	1	....	....	....	....	1	....	2	....	1	2	12	....	....	....	1	....	....	3	....	2	3	....	2	....	....	9	2	....	....
6	....	....	....	....	....	2	....	1	....	....	....	27	....	4	....	....	....	....	1	....	1	3	1	1	....	....	3	3	....	1
7	1	....	....	....	....	3	1	2	....	....	....	16	....	....	....	....	1	....	1	....	2	....	2	2	....	1	16	1	....	....
8	....	....	....	....	....	2	....	5	....	....	....	12	....	....	....	....	....	....	....	....	4	1	3	3	....	....	6	1	....	....
9	1	....	1	....	....	2	....	....	....	....	....	10	....	....	....	....	....	....	....	....	2	3	....	2	....	....	7	....	....	1
10	2	....	....	....	....	1	....	3	....	....	....	16	1	....	....	3	....	....	....	....	1	2	3	5	....	....	14	1	....	....
11	....	....	....	1	....	4	....	4	....	....	....	11	....	....	....	....	....	....	....	....	1	2	....	4	....	....	7	....	....	....
12	....	....	....	....	....	5	....	....	....	....	....	11	....	....	....	....	....	....	....	....	2	3	2	4	....	....	3	....	....	....
13	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	1	....	....	1	1	....	4	....	2	....	....	5	1	1	....
14	....	....	....	....	....	1	....	....	....	....	....	4	....	....	....	....	....	1	1	....	....	2	2	....	....	....	4	1	....	3
15	3	....	1	....	....	5	....	....	2	....	....	9	....	....	....	....	....	....	....	....	7	7	....	3	....	....	3	....	....	1
16	....	....	....	....	....	6	....	1	....	....	....	10	....	....	....	....	....	....	....	....	3	....	....	2	....	....	6	....	....	1
17	2	....	1	....	....	3	....	2	....	....	....	3	....	....	....	....	....	....	....	....	24	4	....	2	....	....	2	....	....	....
18	....	1	....	....	....	6	....	....	....	....	....	6	2	....	....	1	....	....	1	....	26	8	....	1	....	....	9	4	....	....
19	3	....	....	1	1	3	....	5	....	....	....	8	....	....	....	1	....	1	1	....	16	5	....	....	....	....	15	1	....	....
20	....	....	....	....	....	6	....	....	....	....	....	5	....	....	....	....	....	1	1	....	5	5	....	....	....	1	4	....	....	....
21	1	....	....	....	....	2	....	....	....	....	....	6	....	....	....	....	....	....	2	....	8	2	....	....	....	....	3	2	....	2
22	....	....	....	....	....	4	....	....	....	....	....	5	....	....	3	....	....	....	....	....	1	1	....	1	....	1	4	1	....	1
23	....	....	....	....	....	4	....	....	....	....	....	3	....	....	....	1	....	....	....	....	7	10	....	1	....	....	25	....	....	....
24	....	....	....	....	....	3	....	2	....	....	....	8	....	....	2	1	....	....	....	....	....	8	1	1	....	1	7	1	....	....
25	....	....	....	....	....	6	....	1	....	....	....	10	1	....	1	....	....	1	....	....	2	7	....	3	....	....	6	....	....	....
26	....	....	....	....	....	3	....	1	....	....	....	14	....	....	4	....	....	1	1	....	1	14	....	3	....	1	7	....	....	1
27	....	....	1	....	....	1	....	....	....	....	....	19	....	....	2	....	....	....	2	....	1	17	....	....	....	....	6	....	....	....
28	....	....	....	....	....	2	....	....	....	....	....	11	....	....	....	1	....	....	....	....	....	21	....	2	....	....	11	1	1	1
29	....	....	....	....	....	6	....	3	....	....	....	7	....	....	....	....	....	....	....	....	5	48	....	3	....	....	6	1	....	....
30	....	....	....	....	....	8	....	....	....	....	....	4	1	....	1	1	....	....	....	....	....	29	....	1	....	....	5	....	....	....
31	1	....	....	....	....	8	....	....	....	....	1	10	....	1	4	....	....	....	....	....	4	37	....	3	....	....	6	1	....	....
32	....	....	....	....	....	5	....	....	....	....	....	11	....	4	3	1	....	....	1	....	2	25	....	1	....	....	2	....	....	....
33	2	....	....	1	....	1	....	....	....	....	....	10	....	....	1	....	....	....	....	....	....	20	....	2	....	....	5	....	....	....
34	....	....	....	....	....	7	....	....	....	1	....	6	....	....	1	1	....	1	....	....	....	20	....	3	....	1	4	....	1	....
35	....	....	1	....	....	2	....	1	....	....	....	6	....	3	....	....	....	....	....	....	....	19	....	2	....	....	5	1	....	....
36	....	....	....	....	....	3	....	....	....	....	....	3	....	3	....	....	....	....	....	....	1	24	....	1	....	....	9	....	....	....
37	....	....	....	....	....	4	....	....	....	....	....	8	....	....	1	....	....	....	2	....	....	37	2	3	....	....	4	1	....	....
38	....	....	....	....	....	3	....	1	....	....	....	5	....	....	....	3	....	1	2	....	2	30	....	2	....	....	3	2	....	1
39	....	....	....	....	....	2	....	....	....	....	....	10	....	....	....	1	....	....	....	....	....	21	....	....	....	....	5	1	....	....
40	....	....	....	....	....	....	....	....	....	....	....	7	....	5	1	2	....	....	....	....	1	58	....	1	....	....	6	....	....	....
41	....	....	....	....	....	1	1	....	....	....	....	4	....	....	....	1	....	....	....	....	....	46	....	....	....	....	8	....	....	....
42	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	32	....	1	....	....	11	1	1	....
43	....	....	....	....	....	1	....	1	....	....	....	5	....	....	....	2	....	....	2	1	1	100	....	1	....	1	5	3	....	....
44	1	....	....	....	....	....	1	1	....	....	....	4	....	....	....	....	....	....	3	....	....	26	....	1	....	1	16	....	....	....
45	1	....	....	....	....	2	....	1	1	....	....	6	....	....	....	....	....	1	3	1	....	56	....	....	....	....	9	1	....	....
46	....	....	....	....	....	1	....	1	....	....	....	5	....	....	....	....	....	....	....	....	....	49	....	1	....	....	4	....	....	....
47	3	....	....	....	....	1	....	1	....	....	....	7	....	....	....	....	....	....	3	....	1	56	....	2	....	....	11	1	1	....
48	....	....	....	....	....	12	....	....	....	....	....	6	....	....	....	2	....	....	....	....	....	38	....	2	2	....	7	....	....	....
49	....	....	....	....	....	5	....	1	....	....	....	5	....	5	....	....	....	....	1	....	....	35	....	1	....	2	8	....	1	1
50	....	....	....	....	....	....	1	....	....	....	....	6	....	....	1	....	....	....	2	....	1	41	....	6	....	....	13	....	....	1
51	1	....	....	1	....	7	....	....	....	....	....	5	....	....	....	....	....	....	4	....	....	32	....	1	....	2	5	....	1	....
52	1	....	....	....	....	4	....	....	....	....	....	2	....	....	....	1	....	....	4	....	28	31	....	....	1,199	....	4	....	....	1
Total	24	2	7	6	1	170	6	42	3	2	4	443	5	26	25	25	1	8	44	3	163	1,053	17	93	1,201	12	370	33	7	18

Appendix XXVIII.

TABLE SHOWING THE INCIDENCE OF INFECTIOUS DISEASES IN EACH STATISTICAL DISTRICT FOR THE YEAR ENDED 31st DECEMBER, 1953.

Statistical District:	Acute Rheumatism.	Ankylostomiasis.	Brucellosis.	Chorea.	Dengue Fever.	Diphtheria.	Dysentery (Amoebic).	Dysentery (Bacillary).	Encephalitis Lethargic.	Erythema Nodosum.	Infantile Diarrhoea.	Infective Hepatitis.	Lead Poisoning.	Leprosy.	Malaria.	Meningococcal Infection.	Paratyphoid.	Pleural Effusion.	Poliomyelitis.	Puerperal Fever.	Purulent Ophthalmia.	Rubella.	Salmonella Infection.	Scarlet Fever.	Trachoma.	Tetanus.	P.T.B.	Other T.B.	Typhoid Fever.	Typhus Fever.
Albany Municipality	....	....	....	....	....	....	....	1	....	....	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	11	....	....	....
Boulder Municipality	....	....	1	....	....	16	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	46	....	....	....	1	6	....	....	....
Bunbury Municipality....	....	....	....	....	....	1	....	4	....	....	....	18	....	....	....	....	....	....	2	....	....	81	....	....	....	....	19	1	....	....
Carnarvon Municipality	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	1	....	....	....
Claremont Municipality	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	1	....	....	63	....	4	....	1	3	....	....	....
Cottesloe Municipality....	....	....	....	....	....	7	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	16	....	2	....	....	9	....	....	....
Fremantle Municipality	....	....	....	....	....	1	....	....	....	....	....	21	....	....	....	2	....	....	3	1	....	20	....	4	....	....	14	1	....	1
Fremantle East Munic.	....	....	....	....	....	....	....	....	....	....	....	8	....	....	....	1	....	....	....	....	....	4	....	....	....	1	4	1	....	....
Fremantle North Munic.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Geraldton Municipality	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	16	....	1	1
Guildford Municipality	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....
Kalgoorlie Municipality	1	....	1	....	....	6	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	28	....	1	....	....	5	....	2	....
Midland Jct. Municipality	....	....	....	....	....	2	....	2	....	....	....	34	....	....	....	3	....	....	1	....	....	8	....	....	....	....	5	....	....	1
Narrogin Municipality	1	....	1	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	2	....	....	....	....	1	....	....	....
Northam Municipality	....	....	....	....	....	1	....	....	....	....	....	3	....	....	....	....	....	....	1	....	....	1	....	....	....	....	4	1	....	1
Perth Municipality	5	....	....	1	....	31	1	8	....	....	1	45	....	....	....	3	....	....	5	....	....	154	5	11	....	4	81	8	1	4
Subiaco Municipality	....	....	....	....	....	6	....	2	1	....	....	18	....	....	....	....	....	....	....	....	....	28	....	1	....	....	13	....	1	2
Wagin Municipality	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....
York Municipality	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
Albany Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....
Armadale-Kelmscott R.B.	....	....	1	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	1	1	5	....	1	2	....	....	....
Ashburton Road Board	....	....	....	....	....	....	....	....	....	....	....	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Augusta-Margaret River Road Board	....	....	....	....	....	....	....	....	1	....	....	5	....	....	....	6	....	....	1	....	....	....	....	1	....	....	2	....	....	....
Balingup Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bassendean Road Board	1	....	....	....	....	1	....	3	....	....	....	1	....	....	....	....	1	1	....	....	....	3	....	1	....	....	1	....	....	....
Bayswater Road Board	....	....	....	....	....	7	....	2	....	....	....	11	....	....	....	....	....	....	....	....	....	14	1	4	....	....	5	....	....	....
Belmont Park Road Bd.	2	....	....	....	....	5	1	3	....	....	....	12	....	....	....	1	....	1	2	....	....	9	....	4	....	....	5	1	1	....
Beverley Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Black Range Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bridgetown Road Board	1	....	....	....	....	....	....	....	....	....	....	12	....	....	....	1	....	....	....	....	....	5	....	....	....	....	....	....	....	....
Brookton Road Board	....	....	....	....	....	....	....	....	....	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Broome Road Board	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	....	....
Broomehill Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Bruce Rock Road Board	....	....	....	....	....	....	....	1	....	....	....	2	....	....	....	....	....	....	....	....	....	2	....	....	....	....	1	....	....	....
Busselton Road Board	....	....	....	....	....	....	....	1	....	....	....	18	....	....	....	....	....	....	....	....	....	2	....	....	....	....	9	....	....	....
Canning Road Board	1	....	....	....	....	12	....	1	....	....	....	7	....	....	....	....	....	1	2	....	....	10	1	6	....	....	6	3	....	....
Capel Road Board	....	....	....	....	....	....	....	....	....	....	....	6	....	....	....	2	....	....	....	....	....	1	....	1	....	....	....	....	....	....
Carnamah Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Chittering Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Collie Coalfields Road Bd.	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	1	....	....	....	1	....	....	....	4	....	....	....
Coolgardie Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Corrigin Road Board	....	....	....	....	....	....	....	....	....	....	....	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Cranbrook Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cuballing Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cue Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cunderdin Road Board	....	....	....	....	....	....	....	....	....	....	....	8	....	....	....	....	....	....	....	....	....	5	....	....	....	....	1	....	....	....
Dalwallinu Road Board	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dangaragan Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dardanup Road Board	....	....	....	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	1	....	1	....	....	2	....	....	....
Darling Range Road Bd.	....	....	1	....	....	5	....	1	....	....	1	8	....	....	....	1	....	....	1	....	....	17	2	1	....	....	1	1	....	....
Denmark Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	1	....	....	1

APPENDIX XXVIII—*continued.*

	Acute Rheumatism.	Ankylostomiasis.	Brucellosis.	Chorea.	Dengue Fever.	Diphtheria.	Dysentery (Amoebic).	Dysentery (Bacillary).	Encephalitis Lethargic.	Erythema Nodosum.	Infantile Diarrhoea.	Infective Hepatitis.	Lead Poisoning.	Leprosy.	Malaria.	Meningococcal Infection.	Paratyphoid.	Pleural Effusion.	Poliomyelitis.	Puerperal Fever.	Purulent Ophthalmia.	Rubella.	Salmonella Infection.	Scarlet Fever.	Trachoma.	Tetanus.	P.T.B.	Other T.B.	Typhoid Fever.	Typhus Fever.
Dowerin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Drakesbrook Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dumbleyung Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Dundas Road Board	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Esperance Road Board	....	....	....	....	....	17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	1	....	....	....
Fremantle Road Board	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	1	....	....	....	....	2	....	....	1	1	....	....
Gascoyne-Minilya Rd. Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Geraldton Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gingin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gnowangerup Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....
Goomalling Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....
Gosnells Road Board	....	....	....	....	....	1	....	....	....	....	....	2	....	....	....	....	....	....	1	....	....	1	....	2	....	....	3	1	....	....
Greenbushes Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Greenough Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Halls Creek Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Harvey Road Board	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	6	....	....	....	....	3	....	....	....
Irwin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kalgoorlie Road Board	....	....	....	....	....	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	32	....	....	....	1	1	....	....	....
Katanning Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	3	....	2	....	....	....	....	....	....
Kellerberrin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	1	....	....	....
Kent Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kojonup Road Board....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Kondinin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Koorda Road Board	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kulin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Kununoppin-Trayning Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lake Grace Road Board	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	3	....	....	....	....	1	....	....	1
Laverton Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Leonora Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Mandurah Road Board	....	....	....	....	....	4	....	....	....	....	....	2	....	....	....	....	....	....	1	....	....	1	....	....	....	....	2	....	....	....
Manjimup Road Board	....	....	1	....	....	1	....	....	....	....	....	8	....	....	....	....	....	....	2	....	....	2	....	....	....	....	2	1	....	....
Marble Bar Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Marradong Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....
Meekatharra Road Board	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	2	....	....	....
Melville Road Board	....	....	....	....	....	3	....	....	....	1	....	18	....	....	....	1	....	1	2	....	....	15	....	20	....	....	3	2	....	....
Menzies Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Merredin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	....	6	....	1	1	....	1	....	....	....
Mingenew Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Moora Road Board	....	....	....	....	....	....	....	....	....	....	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....
Morawa Road Board	2	....	....	....	....	....	....	1	....	....	....	2	....	....	....	....	....	....	....	....	17	3	....	....	....	....	2	....	....	....
Mosman Park Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	4	....	1	....	....	....	....	....	....
Mt. Marshall Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Mt. Magnet Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Mukinbudin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mullewa Road Board	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	73	....	....	....	....	....	....	....	....	....
Mundaring Road Board	....	....	....	....	....	....	....	2	....	1	....	22	....	....	....	....	....	....	1	....	....	3	....	....	....	....	3	....	....	....
Murchison Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Murray Road Board	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
Nannup Road Board	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....
Narembeen Road Board	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....
Narrogin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....
Nedlands Road Board	....	....	....	....	....	3	....	....	1	....	....	7	....	....	....	1	....	1	....	....	....	38	....	2	....	....	20	1	....	....
Northam Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	4	1	....	....
Northampton Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

Nullagine Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nungarin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Peppermint Grove R.B.	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....
Perenjori Road Board	1	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	6	3	....	....	....	....	....	....	....	....
Perth Road Board	3	....	....	2	....	19	....	5	....	....	....	23	1	....	....	....	....	....	4	....	....	45	2	4	....	....	22	2	1	1
Phillips River Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pingelly Road Board	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Plantagenet Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Hedland Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Preston Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Quairading Road Board	....	....	....	....	....	1	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	9	....	2	....	....	1	....	....	....
Rockingham Road Bd.	....	....	....	....	....	2	1	....	....	....	....	3	....	....	....	....	....	....	....	....	....	1	....	1	....	....	1	1	....	....
Roebourne Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Serpentine-Jarrahdale Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	1
Shark Bay Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Perth Road Board	3	....	....	....	....	4	....	....	....	....	....	18	....	....	....	....	....	1	....	....	....	31	1	6	....	2	8	2	....	....
Swan Road Board	....	....	....	....	....	4	....	....	....	....	....	9	....	....	....	....	....	....	2	....	....	2	1	....	....	....	4	....	....	1
Tableland Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....
Tambellup Road Board	....	....	....	....	....	....		....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tammin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	....	....	....	....	....	....	....	....
Three Springs Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Toodyay Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Upper Blackwood R.B.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	9	....	....	....	....	....	....	....	....
Upper Chapman Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Upper Gascoyne Rd. Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Victoria Plains Rd. Bd.	1	....	....	....	....	....	....	2	....	....	....	2	....	....	....	....	....	....	....	1	....	3	....	....	....	....	....	....	....	....
Wagin Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wandering Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wanneroo Road Board	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
West Arthur Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
West Kimberley Rd. Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westonia Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wickepin Road Board	....	....	....	1	....	....	....	....	....	....	....	3	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Williams Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....
Wiluna Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wongan-Ballidu Rd. Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Woodanilling Road Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wyalkatchem Rd. Bd.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wyndham Road Board	....	....	....	....	....	....	....	....	....	....	....	1	....	8	....	....	....	....	....	....	36	2	....	....	1	....	2	....	....	....
Yalgoo Road Board	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....
Yilgarn Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....
York Road Board	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Rottnest (Department of Public Health)	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ophthalmic Survey of the Kimberley Division by Professor Ida Mann	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	28	....	....	....	1,199	....	....	....	....	....
Contracted outside the State	....	2	....	....	....	....	....	....	....	....	....	....	....	....	6	....	....	....	....	....	....	....	....	....	....	....	22	....	....	1
Service Personnel	....	....	....	....	....	2	....	....	....	....	....	1	....	....	19	....	....	....	....	....	....	282	....	....	....	....	....	....	....	....
Total	24	2	7	6	1	170	6	42	3	2	4	443	5	26	25	25	1	8	44	3	163	1,053	17	93	1,201	12	370	33	7	18

APPENDIX XXIX.

MATERNAL MORTALITY.

Period.	Average Live Births.	Average Maternal Deaths.	Average Rate
1901–1905	6,681	28·0	4·19
1906–1910	7,691	43·4	5·64
1911–1915	8,844	39·4	4·46
1916–1920	7,727	41·4	5·36
1921–1925	8,056	34·2	4·25
1926–1930	8,748	46·8	5·35
1931–1935	8,062	35·4	4·39
1936–1940	8,877	32·4	3·65
1941–1945	10,408	24·4	2·34
1946–1950	13,130	21·4	1·63

Year.	Live Births.	Deaths from									
		Puerperal Septicaemia.		Other Puerperal Infections.		Abortion.		11 other Complications of Pregnancy and of the Puerperal State		All complications of Pregnancy and the Puerperal State.	
		No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
1943	10,481	2	0·19	1	0·10	3	0·29	17	1·62	23	2·19
1944	10,670	2	0·18	2	0·18	5	0·46	18	1·66	27	2·48
1945	10,672	....	....	2	0·19	5	0·47	13	1·22	20	1·87
1946	12,105	....	....	3	0·25	5	0·41	18	1·49	26	2·15
1947	12,874	1	0·08	1	0·08	8	0·62	22	1·71	32	2·49
1948	12,951	2	0·15	4	0·31	1	0·08	13	1·00	20	1·55
1949	13,511	....	....	2	0·15	3	0·22	11	0·81	16	1·18
1950	14,228	....	....	2	0·14	1	0·07	12	0·84	13	0·91
1951	14,794	....	....	2	0·14	3	0·20	11	0·74	16	1·08
1952	15,413	....	....	3	0·19	3	0·19	12	0·78	18	1·17
1953	15,862	....	....	....	....	1	0·06	8	0·50	9	0·57

All rates per thousand live births.

APPENDIX XXX.

STILLBIRTH AND INFANT MORTALITY RATES.

Year.	Total Births Including Stillbirths	Stillbirth Rates.	Neo-Natal Rates.		Total Mortality Rates under One Year.	Other Post Natal Rates Over One Month and Under One Year
			Under One Week.	Under One Month.		
1926	8,534	27·4	....	27·6	48·0	20·4
1927	8,708	26·0	....	23·0	44·7	21·7
1928	8,981	30·9	....	23·1	35·5	12·4
1929	9,316	28·4	18·8	25·8	54·6	28·8
1930	9,456	27·0	18·0	23·5	46·5	23·0
1931	8,777	26·0	20·1	26·6	40·5	13·9
1932	8,175	25·7	21·02	25·2	43·5	18·3
1933	8,105	29·4	18·1	22·5	35·8	13·3
1934	8,029	29·2	19·3	24·8	38·8	14·0
1935	8,377	30·8	20·6	24·8	39·0	14·2
1936	8,730	28·9	19·6	24·8	41·0	16·2
1937	8,850	27·2	16·8	21·2	36·5	15·3
1938	9,325	23·9	16·6	19·1	33·1	14·0
1939 ..	9,249	23·0	16·5	19·7	40·0	20·3
1940	9,363	25·9	20·5	24·9	43·0	18·1
1941	10,375	24·8	15·1	18·1	34·4	15·7
1942	10,109	20·6	17·1	20·3	36·2	15·9
1943	10,759	25·8	17·1	21·0	31·8	10·8
1944	11,144	24·8	18·6	21·0	32·0	11·0
1945	10,896	20·6	18·0	20·0	28·9	8·9
1946	12,398	23·6	17·1	20·6	30·3	9·6
1947	13,178	23·0	16·9	19·4	30·2	13·2
1948	13,197	20·1	16·9	18·7	25·0	8·4
1949	13,779	19·4	16·2	19·0	25·9	6·8
1950	14,468	16·6	16·2	18·0	26·7	8·6
1951	15,091	19·7	16·2	19·7	28·2	8·5
1952	15,696	18·0	15·5	17·6	24·5	6·8
1953	16,130	16·6	13·4	16·2	23·4	7·3

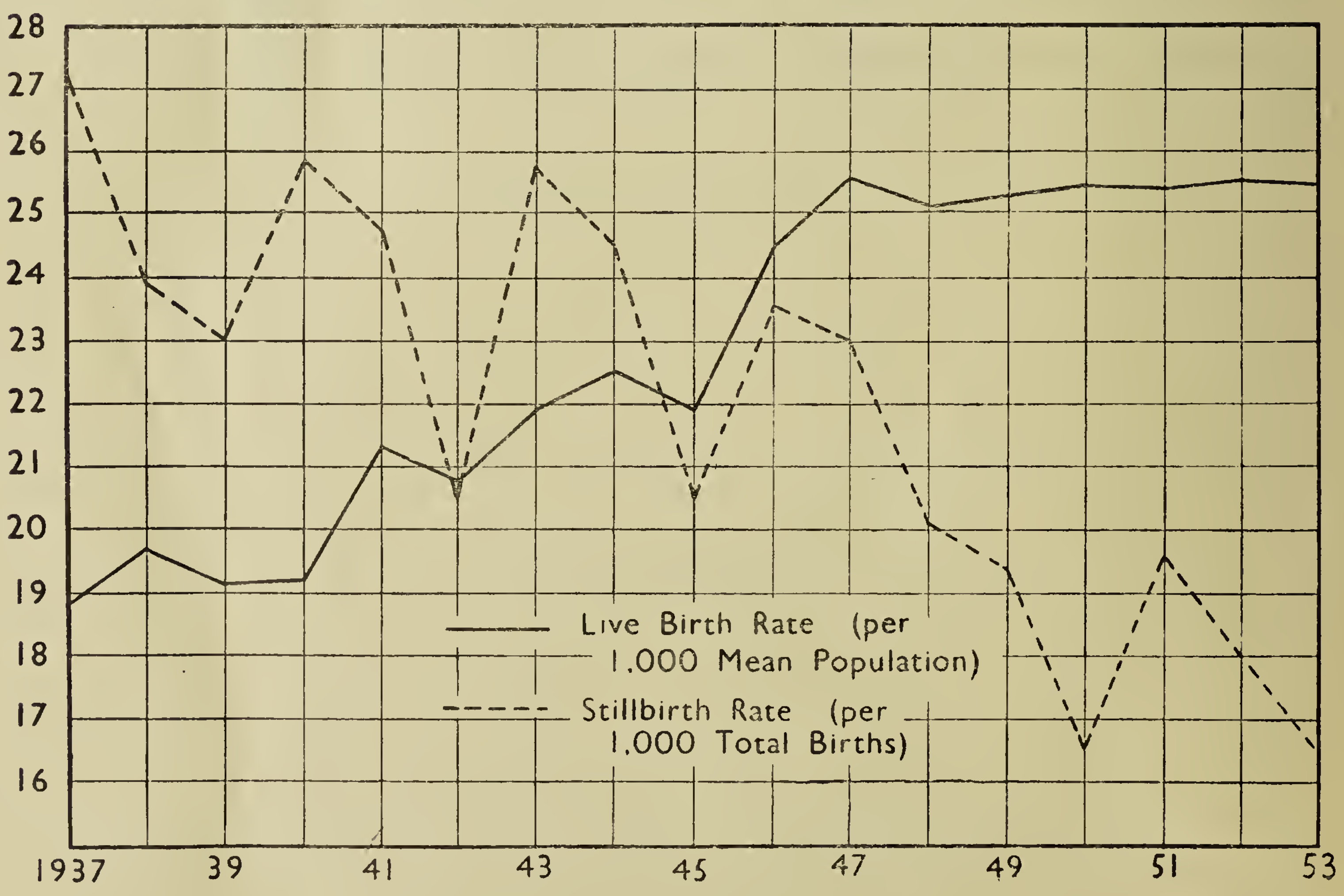
In above table all rates are calculated in deaths per 1,000 of total births, including stillbirths.

APPENDIX XXXI.

WESTERN AUSTRALIA—STILLBIRTH AND BIRTH RATES.

Year.	Mean Population	Live Births.		Still Births.	
		Number	Rate per 1,000 Mean Population	Number	Rate per 1,000 Total Births
1937	457,328	8,609	18·82	241	27·23
1938	463,808	9,141	19·71	224	23·92
1939	469,780	9,036	19·23	213	23·03
1940	473,397	9,121	19·27	242	25·85
1941	473,988	10,118	21·35	257	24·77
1942	476,619	9,901	20·77	208	20·57
1943	476,745	10,481	21·98	278	25·84
1944	481,498	10,870	22·58	274	24·59
1945	487,510	10,672	21·89	224	20·56
1946	492,771	12,105	24·57	293	23·63
1947	502,978	12,874	25·60	304	23·07
1948	514,843	12,931	25·12	266	20·16
1949	533,083	13,511	25·35	268	19·45
1950	558,709	14,228	25·47	240	16·59
1951	581,459	14,794	25·44	297	19·68
1952	602,025	15,413	25·60	283	18·03
1953	622,697	15,862	25·47	268	16·62

WESTERN AUSTRALIA—LIVE BIRTH AND STILLBIRTH RATES.



APPENDIX XXXII.

DIPHTHERIA MORTALITY AND MORBIDITY.

WESTERN AUSTRALIA (1905-1953).

Year.	Mean Calendar Population.	Notifications Received.	Deaths.			Case Mortality %	Incidence Rate per 100,000 Population.	Mortality Rate per 100,000 Population.
			Diphtheria.	"Croup"	Total.			
1905	246,681	228	35	5	40	17·54	92·4	16·21
1906	254,362	347	59	6	65	18·73	136·4	25·55
1907	255,510	821	64	5	69	8·40	321·3	27·00
1908	257,822	1,719	106	5	111	6·45	666·7	43·05
1909	263,279	1,221	75	6	81	6·63	463·8	30·76
1910	271,019	1,066	62	7	69	6·47	393·3	25·46
1911	286,712	764	36	1	37	4·71	266·4	12·55
1912	301,040	634	28	7	35	5·52	210·6	11·62
1913	313,383	957	44	2	46	4·80	305·3	14·67
1914	322,668	785	37	3	40	4·72	243·2	11·46
1915	321,247	1,045	38	2	40	3·63	325·2	11·82
1916	313,066	757	25	8	33	3·30	241·8	7·99
1917	306,339	800	31	1	32	3·87	261·1	10·11
1918	308,198	1,277	26	1	27	2·11	414·3	8·95
1919	319,955	971	32	1	33	3·39	303·4	10·31
1920	330,023	1,080	46	4	50	4·62	327·2	15·15
1921	334,084	958	....	....	44	4·59	286·7	13·17
1922	341,375	377	17	4	21	3·6	169·0	6·12
1923	350,772	504	18	2	20	3·97	143·6	5·70
1924	363,152	511	....	....	14	2·7	140·7	3·85
1925	372,970	334	....	....	6	1·7	94·9	1·60
1926	380,930	256	....	....	11	4·3	67·2	2·88
1927	392,071	273	....	....	6	2·9	69·6	1·53
1928	407,576	639	....	....	13	2·0	156·7	3·19
1929	420,756	539	....	....	33	6·0	128·1	7·84
1930	429,079	1,045	....	....	43	4·1	243·5	10·02
1931	432,347	452	....	....	19	4·2	104·5	4·39
1932	435,041	664	....	....	20	3·0	152·6	4·59
1933	438,780	848	....	....	20	2·4	193·2	4·55
		Mass Immunisation Commenced.						
1934	442,354	974	....	....	36	3·7	220·1	8·13
1935	446,874	1,308	....	....	35	2·6	292·7	7·83
1936	452,294	792	....	....	36	4·54	175·2	7·95
1937	457,328	1,166	....	....	39	3·34	259·3	8·52
1938	463,808	921	....	....	41	4·44	198·5	8·83
1939	469,780	610	....	....	27	4·4	129·9	5·74
1940	473,397	583	....	....	22	3·75	123·1	4·64
1941	473,988	674	....	....	20	3·00	142·1	4·21
1942	476,619	748	....	....	41	5·48	156·9	8·60
1943	476,745	755	....	....	38	5·03	158·3	7·97
1944	481,498	528	....	....	24	4·80	109·6	4·98
1945	487,510	425	....	....	20	4·70	87·1	4·10
1946	492,771	380	....	....	11	2·89	77·1	2·23
1947	502,978	339	....	....	8	2·36	67·3	1·59
1948	514,843	255	....	....	7	2·74	49·5	1·35
1949	533,083	170	....	....	4	2·35	31·88	0·75
1950	558,709	172	....	....	7	4·07	30·78	1·25
1951	581,462	271	....	....	11	4·06	46·60	1·89
1952	602,026	124	....	....	2	1·61	20·60	0·33
1953	622,697	170	....	....	1	0·59	27·30	0·16

Appendix XXXIII.

MEAT INSPECTION FOR THE YEAR ENDED 31st DECEMBER, 1953.

CARCASES CONDEMNED.

No. of Animals Slaughtered.	Emaciation.	Icterus.	Immaturity.	Moribund.	Piroplasmosis.	Unmarketable.	Pyrexia.	Gangrene.	Pleuro-Pneumonia.	Sepsis.	Traumatism.	Tuberculosis.	Actinomycosis.	Peritonitis.	Caseous-Lymphadenitis.	Paratyphoid.	TOTALS.
Fremantle District (including Watson's Bacon Factory).																	
Cattle 21,468	17	....	....	....	....	1	....	9	....	2	2	40	4	....	....	....	75
Calves 479	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep 196,462	141	....	....	6	....	2	14	1	....	10	2	....	....	....	14	....	190
Pigs 59,471	6	14	....	10	....	16	15	....	....	63	....	112	....	19	....	17	272
Totals 277,880	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	537
Midland Junction Abattoirs (including Foggitt Jones, Ltd., Bacon Factory).																	
Cattle 49,592	18	....	....	2	....	2	16	23	....	13	18	92	....	2	....	....	186
Calves 4,034	....	....	3	....	....	1	....	....	....	....	1	....	....	....	....	....	5
Sheep 511,548	1,479	123	....	330	....	51	68	6	....	7	8	....	....	3	16	....	2,191
Pigs 41,311	....	....	....	1	....	4	2	2	....	2	....	75	....	2	....	....	88
Totals 606,485	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2,470
Kalgoorlie District.																	
Cattle 4,272	....	....	....	....	....	....	....	1	....	....	2	....	5	....	....	....	8
Calves 10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep 43,059	1	2	....	12	....	....	3	....	....	2	1	....	....	....	....	....	21
Pigs 1,121	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
Totals 48,462	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	30
Perth City Markets.																	
Cattle 963	1	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	6
Calves 24,181	....	....	205	....	....	218	....	....	....	....	1	....	....	....	....	....	424
Sheep 165	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Pigs 410	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	2
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	433
Fremantle City Markets.																	
Cattle 9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Calves 1,164	....	....	....	....	....	2	....	....	....	3	....	....	....	....	....	....	5
Sheep 106	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pigs	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5
Country Districts.																	
Cattle 14,909	2	....	....	....	....	2	3	....	....	1	5	4	....	....	....	....	17
Calves 4,137	6	....	91	1	....	5	....	....	....	1	2	1	....	....	....	....	107
Sheep 136,219	398	3	....	7	....	2	18	....	....	4	25	....	....	....	13	....	470
Pigs 4,760	....	1	....	3	....	2	4	....	....	3	....	4	....	....	....	....	17
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	611

PART CARCASES CONDEMNED.

No. of Animals Slaughtered.	Abscess.	Actinomycosis.	Caseous-Lymphadenitis.	Tuberculosis.	Arthritis.	Unmarketable.	Traumatism.	TOTALS.
Fremantle District (including Watson's Bacon Factory).								
Cattle 21,468	1	73	....	29	....	....	4	107
Calves 479	....	....	....	....	....	....	....	....
Sheep 196,462	....	....	77	....	30	....	6	113
Pigs 59,471	16	....	....	814	....	....	3	833
Totals 277,880	....	....	....	....	....	....	....	1,053
Midland Junction Abattoirs (including Foggitt Jones, Ltd., Bacon Factory).								
Cattle 49,592	20	253	....	130	13	74	34	704
Calves 4,034	....	....	....	....	....	12	....	12
Sheep 511,548	....	....	107	....	62	417	5	591
Pigs 41,311	22	....	....	75	5	1	17	120
Totals 606,485	....	....	....	....	....	....	....	1,427
Kalgoorlie District.								
Cattle 4,272	3	76	....	58	....	2	5	144
Calves 10	....	....	....	....	....	....	....	....
Sheep 43,059	....	....	27	....	9	....	6	42
Pigs 1,121	....	1	....	3	1	1	1	7
Totals 48,462	....	....	....	....	....	....	....	193
Perth City Markets.								
Cattle 963	....	....	....	1	....	....	2	3
Calves 24,181	....	....	....	....	....	....	....	....
Sheep 165	....	....	....	....	....	....	....	....
Pigs 410	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	3
Fremantle City Markets.								
Cattle 9	....	....	....	....	....	....	....	....
Calves 1,164	....	....	....	....	....	....	1	1
Sheep 106	....	....	....	....	....	....	....	....
Pigs	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	1
Country Districts.								
Cattle 14,909	9	31	....	22	2	5	21	90
Calves 4,137	....	....	....	....	....	....	1	1
Sheep 136,219	30	2	72	....	36	3	11	154
Pigs 4,760	14	....	....	33	2	5	13	67
	....	....	....	....	....	....	....	312

ORGANS CONDEMNED.

No. of Animals Slaughtered.	Abscess.	Actinomycosis.	Angiomatosis.	Cirrhosis.	Fatty Infiltration.	Hydro-Nephrosis.	Hydatids.	Melanosis.	Necrosis.	Pericarditis.	Pleuro-Pneumonia.	Tuberculosis.	Unmarketable.	Parasitic.	TOTALS.
Fremantle District (including Watson's Bacon Factory).															
Cattle 21,468	239	61	127	1	34	....	....	3	....	....	4	1	2	1	472
Calves 479	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep 196,462	....	....	....	....	....	....	1,850	....	....	....	....	....	....	....	1,850
Pigs 59,471	....	....	....	2,418	1,156	11,646	....	....	4,648	3,625	....	....	308	132	27,933
Totals 277,880	....	....	....	....	....	....	....	....	....	....	....	....	....	....	29,251
Midland Junction Abattoirs (including Foggitt Jones, Ltd., Bacon Factory).															
Cattle 49,592	414	4	394	85	171	80	....	....	27	44	3	66	138	1	1,427
Calves 4,034	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep 511,548	....	....	....	105	93	....	2,250	....	....	....	....	....	1,983	66	4,497
Pigs 41,311	....	....	....	4	....	7,160	30	....	3,432	1	....	....	....	....	10,627
Totals 606,485	....	....	....	....	....	....	....	....	....	....	....	....	....	....	15,548
Kalgoorlie District.															
Cattle 4,272	53	40	4	10	18	4	2	....	....	3	....	64	11	....	209
Calves 10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep 43,059	7	....	....	276	19	....	1,063	234	1	....	....	....	112	47	1,759
Pigs 1,121	....	....	....	....	....	3	....	....	60	....	....	....	....	....	63
Totals 48,462	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2,031
Perth City Markets.															
Cattle 963	....	....	....	....	....	....	....	....	....	....	....	....	32	....	32
Calves 24,181	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep 165	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pigs 410	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	32
Fremantle City Markets.															
Cattle 9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Calves 1,164	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep 106	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Pigs	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Country Districts.															
Cattle 14,909	158	76	67	44	32	....	....	2	10	....	....	57	59	141	646
Calves 4,137	....	....	....	....	....	....	....	....	....	....	....	....	4	....	4
Sheep 136,219	333	2	17	442	90	....	....	270	26	....	....	....	244	2,780	4,204
Pigs 4,760	7	....	....	23	2	....	....	....	254	....	....	2	97	527	912
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5,766

Totals of Animals Slaughtered—Cattle, 91,213 ; Calves, 34,005 ; Sheep, 987,559 ; Pigs. 107,073.

LOCAL AUTHORITIES, 1953.

——	Cattle.	Calves.	Sheep.	Pigs.
Albany	2,331	668	28,287	871
Bunbury	2,267	1,043	19,016	581
Busselton	1,161	1,196	7,878	164
Collie	652	179	3,938	288
Geraldton	1,287	569	17,359	101
Harvey	2,746	183	17,011	663
Katanning	833	52	6,495	127
Merredin*	254	10	2,722	91
Narrogin	1,050	91	7,691	323
Northam	1,914	135	18,033	1,432
Wagin	348	11	3,133	100
York*	66	....	656	19
Totals	14,909	4,137	132,219	4,760

* Not a complete Year's Kill.

Appendix XXXIV.

REVENUE AND EXPENDITURE FOR YEAR 1953.

REVENUE.

	£	s.	d.
License Fees	42	1	0
Meat Inspection Fees	9,898	11	3
Fish Inspection Fee	527	6	5
Pathological Laboratory	1,669	10	5
Sanitation Refunds	....		
Inspection of Plans (Septic Tanks)	4,074	4	8
Miscellaneous	3,189	0	2
Nurses and Midwives Registration and Examination Fees	1,700	5	3
Local Health Authority Recoups	....		
T.B. Diagnosis (Generally)	518,451	1	8
T.B. Diagnosis (Wooroloo)	29,421	18	6
Argentine Ants (Sale D.D.T. and Baits)	5,264	0	9
Health Supervision Charges	1,765	10	0
Maintenance Northern Territory Natives	952	10	7
Derby Leprosarium			
Baby Patterns	28	17	6
Hospital Benefits—Lepers	7,810	16	0
S. & O. Benefits—Lepers	1,042	16	0
	£585,835	10	2

EXPENDITURE.

	£	s.	d.
Salaries	355,181	6	9
Payments Local Health Authorities	10,298	13	8
School Hygiene	7,990	11	11
Travelling and Transport	3,328	10	9
Postage and Telephones	2,372	8	6
Laboratory	16,658	19	10
Venereal Diseases	3,023	6	6
Miscellaneous	21,480	8	11
Infant Welfare Centres	39,640	1	10
Maintenance and Transport of Lepers	23,755	19	8
Medical Officer and School Dentists Travel	5,169	15	5
Diphtheria Immunisation	100	3	1
T.B. Clinics	248,985	12	11
Argentine Ants	18,931	4	2
Cancer Research	709	13	6
Sanitation Government Buildings	17,202	9	3
Coconut Compensation	517	11	6
Total Expenditure	£775,346	16	0

By Authority: WILLIAM H. WYATT, Government Printer, Perth.